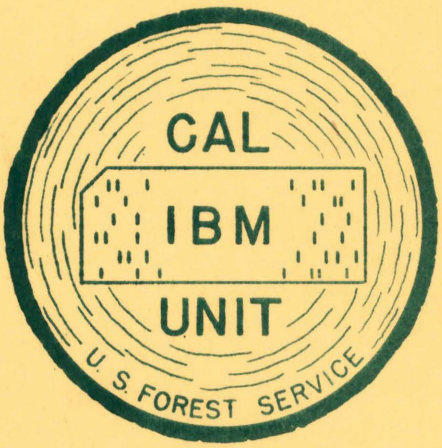
Thesis/
Reports
McRorey,
R. P.

PROPOSED DINUBA MILL SCALE STUDY AND PLAN FOR COMPILATION OF MILL SCALE STUDY DATA BY THE IBM METHOD

R. P. McRorey

Growth Cons.
Models & Appl's

PROPOSED DINUBA MILL SCALE STUDY
AND
PLAN FOR COMPILATION OF
MILL SCALE STUDY DATA
BY THE IBM METHOD



Prepared by

R. P. McRorey
Division of Timber Management - California Region
and
R. M. Miller
Division of Forest Economics
California Forest and Range Experiment Station

Forest Service - U. S. Department of Agriculture

LIBRARY COPY
ROCKY MT. FOREST & RANGE
EXPERIMENT STATION

CONTENTS

Page

Part I

PROPOSED DINUBA MILL SCALE STUDY

Introduction 1
Sawmill Phase 2
Surfacing Phase 4
Tentative White Fir Log Grades 6

Part II

SUMMARY OF THE IBM METHOD USED IN COMPILING MILL SCALE STUDY DATA

1. Introduction 1
2. Log Phase 1
   2.1 Log Phase Summary Tabulations 3
3. Lumber Phase 6
   3.1 Green Lumber 6
      3.11 Green Lumber Summary Tabulations 6
   3.2 Rough Dry Lumber 9
   3.3 Surfaced Lumber 11
4. Lumber Summary Tabulations 13
   4.1 Rough Dry Lumber Tables 13
   4.2 Surfaced Lumber Tables 16
5. IBM Card Deck Descriptions 17
6. Coding and Codes 42
7. Data Forms and Tables 46

Part III

PLAN FOR COMPILATION OF MILL SCALE STUDY DATA BY THE IBM METHOD

1. Introduction 1
2. Compilation of Log Phase Data 2
3. Compilation of Lumber Phase Data 3
   3a. Complete Green Grading 3
   3b. Complete Rough Dry Grading 6
4. Summary Tabulations 7
5. Punch Cards Required 12
6. Coding and Codes 20
7. Layout of Forms 25

LIBRARY COPY
ROCKY MT. FOREST & RANGE
EXPERIMENT STATION

CONTENTS (cont.)

Page

Part IV

SUPPLEMENT TO PLAN FOR COMPILATION OF MILL SCALE STUDY BY THE IBM METHOD

1. Introduction 1
2. Compilation of Log Phase Data 2
3. Compilation of Lumber Phase Data 2
   3a. Complete Green Grading 3
   3b. Complete Rough Dry Grading 3
4. Summary Tabulations 5
5. Punch Cards Required 5
6. Coding and Codes 5
7. Layout of Forms 6,7,8

Attachments to be inserted in 11/54 Plan, 13 to 24c

S
SALES
Appraisals
Mill Scale Studies

San Francisco, California
November 12, 1954

PART I

PROPOSED

DINUBA MILL SCALE STUDY

SEQUOIA NATIONAL FOREST

R. P. McRorey
Valuation Section
Division of Timber Management
California Region
U. S. Forest Service

INTRODUCTION

Objectives

1. To determine the yields of merchantable white fir lumber by standard grades as cut from logs of various sizes having definable external characteristics.
2. To determine the amount of loss and change in grade in the surfacing of rough dry lumber.

Cooperators

The Ivory Pine Company, Dinuba, California

U. S. Forest Service, California Region

Division of Timber Management

Sequoia National Forest

California Forest and Range Experiment Station

U. S. Forest Service, Forest Products Laboratory

General

The study will be a two-phase project. The first part covering the green-lumber manufacturing or Sawmill phase. The second will be the remanufacturing or Surfacing phase. The first part of the study will carry through the Sawmill. All lumber from the study logs will be identified. Following this the study lumber will be dried in the normal manner and held aside for later grading and tallying. The second part of the study will thus have to be deferred until the study lumber has gone through the normal or customary drying period.

Organization and Responsibilities

Regional Office, Division of Timber Management will:

1. Organize and supervise project.
2. Draft log grade descriptions.
3. Provide forms for recording log scales and log grades.
4. Furnish number stamps and materials for designating study logs and lumber.
5. Provide tally boards and tatum holders for log graders and scaler.
6. Furnish the following personnel for participation in the study:
   - (1) Supervisor
   - (1) Relief Man
   - (1) Log Scaler
   - (1) Log Grader

7. Analyse and compile the study data.

8. Prepare a report on the study and furnish cooperators with a copy.

Sequoia National Forest will:

1. Supply 2 scale sticks (new)

2. Furnish 2 board markers

3. Furnish 1 log grader

4. Furnish 1 log caller

5. Furnish 1 log turner

California Forest and Range Experiment Station will:

1. Prepare the detailed plan for the Surfacing study and supervise that phase of the project.

2. Assist with log grading.

3. Participate in analysis of the study data and preparation of report.

The Ivory Pine Company will:

1. Furnish one (1) fully certified Western Pine Association grader - or secure the services of the Association's inspector grader.

2. Provide two (2) experienced lumber tally men.

3. Supply tally forms for recording lumber volumes by log number and grade.

4. Extend tally forms to show footage by lumber grades.

PART 1.

Sawmill Phase

Sawing Practice

Since the primary objective of the study is to determine the lumber grades that can be produced from white fir timber in the South Sierra area, sawing practices will be followed which will yield the maximum recovery of the standard lumber grades which historically give the highest price, irrespective of present market conditions or special requirements such as box, moulding, or shop. In other words the sawing practices followed during the study period will be geared to produce selects, shop, and yard lumber without regard to special orders or items.

Study Logs

For the study all sizes and types (grades) of white fir logs occurring in the timber stands will be needed.

A representative sample, or number of logs, of each separate grade and each diameter group will be necessary. Approximately 10 logs of each 4-inch diameter group through the size range of each log grade class should be sufficient.

Rough calculations indicate that 400 to 600 logs will result in a strong sample. The actual number needed may be revised as the study progresses and it is possible to calculate and measure the actual range in diameters and grades being studied from the "normal" run of logs.

If possible and practical the study logs should be "boomed" off in a separate area. If the study crew efficiency and mill layout are such, the study logs may then be run without interruption thus attaining the data in the shortest time and least costly manner.

Log Grading

The study logs will be graded on the basis of and in strict conformance with the attached log grade descriptions. General notes on the appearance and upon the size, number and condition of knots will also be recorded for each log. In addition, if sufficient personnel is available knot sizes and positions and other external log characteristics will be diagramed.

Because of operational characteristics it will be necessary to grade the logs in the water as they pass through the debarker. While the logs revolve slowly in the debarker and the grader should have sufficient time to accurately grade each log, pregrading before the logs enter the debarker is desirable and one to two men will be assigned to turn the logs for the grader's inspection before they enter the debarker.

The log grader will be responsible for numbering each study log so that the scale and lumber grade recovery can be tied back to each individual log.

The log grader will also keep a "spot listing diagram" of logs by 4-inch diameter classes so as to show distribution of sample by grades and d.i.b. classes day by day.

Check grading will be done to determine to what degree the log grades can be applied consistently by different personnel.

Log Scaling

Scaling will be done after the logs are raised from the well by the hydraulic lift. It will be done in strict accordance with the "Instructions For Scaling National Forest Timber". The gross and net scale (Scribner Decimal C) as well as the length, diameters inside bark at both ends,

and the deductions by type of defect will be recorded on "Log Scale Form #26" (attached).

Since the logs will not necessarily come to the scaler in the same sequence as they were graded the scaler will reassign numbers to the study logs beginning with #1 and continuing on in order. This will facilitate the work of the board markers and minimize the possibilities of mis-numbering boards.

Log Identification

A "log caller" will be stationed on the mill floor alongside the log lift from the "well". By means of a drop leaf number board and personal contact he will keep the board markers advised of the number of the log currently on the carriage.

Board Markers

Two board markers will be used to place a number corresponding to the log number of each log on every board sawed from each individual log. Care must be taken to see that the numbers are so placed that they are not lost in "ripping" or "trimming".

Disposition of Study Lumber

All study lumber, after it leaves the mill, will be set apart so that it does not become mixed with non-study lumber. It will be held intact through the normal drying practices and period and again set aside for the second or surfacing phase of the study.

Time Required

Four (4) to five (5) full days of normal mill operation should provide an adequate sample of study logs. Prior to securing data on study logs it will be highly desirable to spend approximately one-half day on a "dry-run" to familiarize study personnel with their respective jobs and to firm-up the study techniques.

PART 2

Surfacing Phase

Two methods or approaches to the second part of the study appear feasible. Either method would, in the final analysis, result in reliable and useable data. Each has its advantages and disadvantages from a study and operational standpoint. In either case it will be necessary at some point to tally and grade each and every board cut from the study logs.

One method would be to run all of the study lumber over a sorting table after drying and before surfacing and to record the grade and tally of each board. Then - sort out a random sample of each lumber grade, tally this sample into the planer, and grade and tally it after surfacing. This is the preferred method and would enable broader use of the study data.

It has the disadvantage that it is not the usual practice followed by the operation and would necessarily cause some interruption and/or duplication in the normal operating procedures employed at the plant.

The alternate method would be pass the rough dry lumber through the planer and to re-number every study board as it comes from the planer and to then grade and tally every board. Under this approach some operational difficulties might be encountered in re-numbering every board and it would result in a number on each surfaced board which might be objectionable in marketing. In addition under this approach it will not be possible to obtain figures on, or determine, losses or changes in grade due to surfacing.

While the final and detailed plans for the second part of the study can be deferred until it is decided which method is to be used, certain practices and procedures will be the same for either approach:

Lumber Grading:

All study lumber will be graded under the current Western Pine Association grades applicable to white fir. Grading will be on the basis of individual Association grades. Tentatively the grades to be used are:

C & Better	1 Shop	2 & Better Common	2 & Better Dimension
D Select	2 Shop	3 Common	3 Dimension
Factory Select	3 Shop	4 Common	
		5 Common	

Inch shop and moulding will be graded into one of the above grades. Combinations may be made later, but for study purposes single grades will be kept as combination grades contain varying amounts of the individual grades.

Lumber Tallying:

All lumber will be "piece" tallied on such forms or tally sheets as are most convenient to the tallymen employed.

Handling of Study Lumber:

In order to minimize possibilities for error and to keep the study time at a minimum and thus accomplish the job at the least cost with a minimum amount of disruption in the normal plant operation, all study lumber should be segregated after the normal drying practices, held apart, and then graded, tallied, surfaced and retallied as a continuous operation.

ATTACHMENT
11-12-54

Tentative White Fir Log Grades

GRADE I - Select Type

Logs at least 90 percent surface clear. Straight and generally smooth in appearance. Spiral grain not to exceed 1 in 5. Admits any one of the following:

(a) One knot in the central zone larger than 3 inches in diameter.

(b) Two scattered knots in central zone less than 3 inches in diameter or 4 scattered pin knots.

(c) Any number of knots of any size within one (1) foot of one end.

(d) Concentrated grouping of knots of any size or other defect or blemish affecting not over one-fourth of the circumference for a length of six (6) feet from one end (logs having fire scars covering a larger area should be graded as having been long butted).

(e) A line of knots less than 3 inches in diameter for the full length of the log (1 larger knot permitted) that affect a strip of the circumference not wider than three-tenths of the log d.i.b. at the small end. A straight grained frost crack would be permitted in an otherwise high-grade log.

GRADE 2 - Shop Type

Logs which are 50 percent surface clear in length or circumference. In addition, logs upon which the blemishes and knots are so distributed as to produce factory cuttings. On such shop logs, 50 percent or more of the surface should be in clear areas, at least 8 feet long and 6 inches or more in width between knots and blemishes.

GRADE 3 - Common Type

Logs less than 50 percent surface clear. Any combination of knots or blemishes permitted which are not permitted in the higher grades. Logs must produce not less than 50 percent of their gross contents in common or better grades of lumber.

(a) Any number of knots not over 3 inches in d.i.b.

(b) Any number of knots up to but not exceeding 5 inches in d.i.b.

(c) Admitting large burly knots in excess of 5 inches in d.i.b.

RE-CAL
FOREST SURVEY
IBM System
Contracts, No. 1573-02

May 15, 1956

PART II

SUMMARY OF THE IBM METHOD USED

IN

COMPILING MILL SCALE STUDY DATA

R. M. Miller
Division of Forest Economics
California Forest and Range Experiment Station

SUMMARY OF THE IBM METHOD USED IN COMPILING MILL SCALE STUDY DATA

1. INTRODUCTION

The Plan for Compilation of Mill Scale Study Data by the IBM method, of November 1954; and the Supplement to the Plan, of December 17, 1954; outline the IBM procedures that were proposed for use in compiling the Dinuba mill scale study data for the Division of Timber Management, Region 5. The procedures outlined in the Plan and Supplement are satisfactory for use in compiling mill scale study data that are obtained in the manner described. These procedures were followed in the larger part of the job of compiling the Dinuba Mill Scale Study data. However, as compilation progressed, the Division of Timber Management requested that additional items of data be incorporated with the original data and be compiled with it. Also, more efficient methods of compiling certain parts of the data became apparent and were used. The methods that were used to compile the Dinuba Mill Scale Study are summarized here.

The boards sawn from the study logs were 100 percent green graded and tallied. These boards were dried and then rough dry graded and tallied. Board identity by log number was maintained through the rough dry phase of the study. A sample of the boards of each rough dry grade was selected for surfacing. These rough dry boards were tallied into the planer by rough dry grade. The surfaced boards of each rough dry grade were tallied out of the planer by surfaced grade. Board identity by log number was not maintained in the surfacing phase of the study. The green, rough dry, and surfaced tallies are described in the Introduction to the Supplement.

2. LOG PHASE

The log phase data was compiled as described in section 2--Compilation of Log Phase Data, of the Plan and Supplement. In addition to the data listed for each log, the average value per M of the rough dry lumber was calculated and punched in each card of Log Deck No. 11.

The availability of this log phase data on IBM cards offered an opportunity for additional analysis of log volumes by the International $\frac{1}{4}$-inch log rule, as compared to the Scribner Decimal C and cubic foot log volumes, and the green lumber recovery in board feet. Therefore, the Log Deck No. 11 was reproduced into the International $\frac{1}{4}$-inch B.F. Volume and Cubic Foot Volume Log Deck No. 21 (described in section 5.(15)). One card No. 21 was prepared for each card No. 11. Each card No. 21 contains the following items: mill scale study number, log number, log grade,

species, 4" DIB group, log length, large end DIB[1/], small end DIB, gross scale-Scribner Dec. C, net scale-Scribner Dec. C, number of boards sawn from log, net percent of gross scale-Scribner Dec. C, green lumber recovery-FBM, and green lumber recovery percent of Scribner Dec. C net log scale.

The gross cubic foot log volume was calculated and punched for each log using the Cubic Log Volume Calculation Master Deck No. 85 (described in section 5.(16)), in accordance with the basic formula :

$$V = \frac{S_A + L_A}{2} \times L, \text{ when}$$

V = Cubic foot volume
S_A = Basal area small end, square feet
L_A = Basal area large end, square feet
L = Length, feet (including trim allowance)

The basic formula is expressed as follows, using items in Log Cards No. 21:

$$V = \frac{\left(\left[\left(\frac{S_D}{2}\right)^2 \cdot \pi\right] + \left[\left(\frac{L_D}{2}\right)^2 \cdot \pi\right]\right) \times (L + 0.3), \text{ when}}{2 \times 144}$$

V = Cubic foot volume
S_D = Diameter i.b. small end, inches
L_D = Diameter i.b. large end, inches
L = Length, feet (not including trim allowance)
0.3 = Trim allowance, feet
π = 3.1415926
144 = Square inches in one square foot

This formula was refined for machine use as follows:

$$V = \left(\left[(.5S_D)^2 + (.5L_D)^2\right] \times 0.01090831\right) \times (L + 0.3), \text{ when}$$

$$0.01090831 = \frac{3.1415926}{2 \times 144}$$

The International $\frac{1}{4}$-inch gross volumes were gang punched into Log Deck No. 21 using the International $\frac{1}{4}$" Log Rule Master Deck No. 86 (described in section 5.(17)). The International $\frac{1}{4}$-inch log net volumes were calculated by applying the Scribner Dec. C net percent of gross to the International $\frac{1}{4}$-inch log gross volumes.

The Log Cards No. 21 were used to prepare summary tabulations as described in section 2.1.

1/ The large end DIB was calculated and punched for each butt log by applying an average form factor to the small end DIB.

2.1 Log Phase Summary Tabulations. Listings and summary tabulations were prepared from the log phase data as described and illustrated below.

2.11 Log Table 1--Listing of Log Cards No. 11. The Log Deck No. 11 was sorted in order by log number; the items punched in each card were listed; and final totals of the number of logs, Scribner Dec. C gross and net scale, and number of boards sawn were accumulated.

The form of Log Table 1 is:

Mill scale study no.	Log no.	Log grade	Species	4" DIB group	Log length ft.	Diameter, inches: Large end	Diameter, inches: Small end	Log scale, Scrib.Dec.C: Gross	Log scale, Scrib.Dec.C: Net	No of boards	Net % of gross scale (3 dec.)
xx	xxxx	x	xx	xx	xx	xx	xx	xxx	xxx	xxx	xxxx
etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.

At the end of the listing the following final totals were printed:

	Number of logs	Total log scale, Dec.C: Gross	Total log scale, Dec.C: Net	No. of Boards
	xxxx*	6 x's*	6 x's*	6 x's*

2.12 Log Table 2--Listing and Tabulation of Log Card No. 11 by 4" DIB Group, Log Grade, and Species. The log deck No. 11 was sorted in order by 4" DIB group, log grade, and species; certain items were listed for each card; and minor totals of the number of logs, gross scale, net scale, green lumber recovery, rough dry lumber recovery, and intermediate totals of the rough dry lumber recovery were accumulated.

The form of Log Table 2 is shown below. The data punched in each card were listed as indicated by the headings below.

Log Table 2.

Mill scale study no.	Species	Log no.	Log grade	4" DIB group	Log length	Diameter, inches: Large end	Diameter, inches: Small end	Log scale, Dec. C: Gross	Log scale, Dec. C: Net	Net %: gross scale	No. of bds.	Green lumber: Recovery: % net FBM (1 ded.)	Green lumber: Recovery: log scale	Rough dry lumber: Recovery: % net FBM (1 dec.)	Rough dry lumber: Recovery: log scale	Rough dry lumber: % net: % green lumber recovery	Avge. value (2 dec.)
xx	xx	xxxx	1	07	xx	xx	xx	xxx	xxx	xxxx	xxx	xxxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.
Minor totals																	
etc.	etc.	etc.	1	08	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.
etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.
Minor totals																	
etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.
Intermediate totals																	
xx	xx	xxxx	2	05	xx	xx	xx	xxx	xxx	xxxx	xxx	xxxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.

In addition, minor and intermediate totals were printed as indicated below:

	Number of logs	Gross log scale: Dec.C	Net log scale: Dec.C	Green lmbr. recovery FBM (1 dec.)	Rough dry lumber recovery FBM (1 dec.): By DIB group	Rough dry lumber recovery FBM (1 dec.): By log grade
End of listing for each 4" DIB group	xxxx*	xxxxx*	xxxxx*	xxxxxx*	xxxxxx*	
End of listing for each log grade						8 x's*

2.13 Log Table 3 - Log Volumes by Diameter Classes and Groups and Species. The Log Deck No. 21 was sorted in order by small end DIB and species; and minor, intermediate, and major totals of the number of logs, Scribner Dec. C gross and net volumes, International $\frac{1}{4}$-inch gross and net volumes, gross cubic foot volume, and green lumber recovery were accumulated.

The form of Log Table 3 is:

Mill scale: study no.	Species	4" DIB class	1" DIB class	No. logs	Scribner Dec. C Gross	Scribner Dec. C Net	Int. $\frac{1}{4}$" Gross	Int. $\frac{1}{4}$" Net	Cu. Ft. Gross (1 dec.)	Green lmbr. recov. (same as 1" DIB class)	4" DIB totals (same as 1" DIB class)	Species totals (same as 1" DIB class)
xx	01	02	06	xxxx*	6 x's*	6 x's*	6 x's*	6 x's*	6 x's*	8 x's*		
			07	etc.	etc.	etc.	etc.	etc.	etc.	etc.		
			etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	Interm. totals	
		03	10	etc.	etc.	etc.	etc.	etc.	etc.	etc.		
		etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	Major totals
	02	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.

3. LUMBER PHASE

The boards sawn from the study logs were identified and tallied as described in section 3 - Compilation of Lumber Phase Data, of the Supplement to the Plan.

3.1 Green Lumber. A complete tally was made of the green lumber and a green grade was assigned to each board. Green lumber was compiled as described in section 3a - Complete Green Grading, of the Supplement to the Plan.

The green lumber tally and grade were punched into the initial lumber grade and tally summary Deck No. 13 (described in section 5.(6)). It was possible to transfer the green lumber data directly to the summary Deck No. 13, instead of to the board Deck No. 12, as specified in the Plan, because all of the boards for each log were recorded together by grade. A simple addition and multiplication gave the green lumber recovery by grade for each log, which was then transferred to the deck of summary cards No. 13.

The summary Deck No. 13 was sorted in order by green lumber grade and log number to place all of the cards for a log together in a control group. These cards were then tabulated and the green lumber recovery and number of green grades was summed for each log. At the same time, the Green Lumber Recovery per Log Summary Work Deck No. 11(12)2, described in Section 5.(2), was summary punched.

The summary Work Deck No. 11(12)2 and the Log Deck No. 11 were merged and the green lumber recovery was gang punched into each Log Card No. 11. The green lumber recovery percent of the net log scale was calculated and punched in each Log Card No. 11.

3.11 Green Lumber Summary Tabulations. Summary tabulations of green lumber recovery were prepared as described and illustrated below.

3.111 Green Lumber Table 1 - Green Recovery and Number of Green Grades by Log. The Initial Lumber Grade and Tally Summary Deck No. 13 for kind of tally code 1 was sorted in order by green lumber grade, log number, and species; and minor totals of the number of green grades, and minor and intermediate totals of the green lumber tally were accumulated.

The form of Green Lumber Table 1 is:

Mill scale study no.	Species	Log no.	No. of green grades per log	Green lumber tally FBM (1 dec.) Per log	Per species
xx	01	0001	xx*	xxxxx*	
		0002	xx*	xxxxx*	
		etc.	etc.	etc.	8 x's*
	02	etc.	etc.	etc.	etc.

3.112 Green Lumber Table 2--Number of Logs, Log Volumes, and Lumber Recovery by 4" DIB Group, Log Grade, and Species. The Log Deck No. 11 was sorted in order by 4" DIB group, log grade, and species; and minor, intermediate, and major totals of the number of logs, Scribner Dec. C gross and net log scale, and green lumber recovery were accumulated.

The form of Green Lumber Table 2 is:

Mill scale study no.	Species	Log grade	4" DIB group	4" DIB group totals: No. of logs	Scribner Dec.C gross	Scribner Dec.C net	Green lmbr.recov. FBM (1 dec.)	Log grade totals (same as 4" DIB group totals)	Species totals (same as 4" DIB group totals)
xx	01	1	07	xxx*	5 x's*	5 x's*	6 x's*		
			08	etc.	etc.	etc.	etc.	Totals	
			etc.	etc.	etc.	etc.	etc.	etc.	Totals
		2	etc.	etc.	etc.	etc.	etc.	etc.	etc.
	02	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.

3.113 Green Lumber Table 3--Green Lumber Recovery by Lumber Grade and Species. The Initial Lumber Grade and Tally Summary Deck No. 13 for kind of tally Code 1 was sorted in order by lumber grade and species; and minor and intermediate totals of green lumber recovery were accumulated.

The form of Green Lumber Table 3 is:

Mill scale study no.	Kind of tally	Species	Green lumber grade	Green lumber recovery, FBM (1 dec.) by: Lumber grade	Species
xx	1	01	13	6 x's*	
			14	etc.	
			etc.	etc.	8 x's*
		02	etc.	etc.	etc.
		etc.	etc.	etc.	etc.

3.114 Green Lumber Table 4--Green Lumber Recovery by Lumber Grade, Log Grade, and Species. The Initial Lumber Grade and Tally Summary Deck No. 13 for kind of tally Code 1 was sorted in order by lumber grade, log grade, and species; and minor, intermediate and major totals of green lumber recovery were accumulated.

The form of Green Lumber Table 4 is:

Mill scale study no.	Kind of tally	Species	Log grade	Green lmbr. grade	Green lumber recovery, FBM (1 dec.) by: Lumber grade	Log grade	Species
xx	1	01	1	13	6 x's*		
				14	etc.		
				etc.	etc.	6 x's*	
			2	etc.		etc.	
			etc.	etc.		etc.	8 x's*
		02	etc.	etc.			etc.
		etc.	etc.	etc.			etc.

3.115 Green Lumber Table 5--Green Lumber Recovery by Lumber Grade, 4" DIB Group, Log Grade, and Species. The Initial Lumber Grade and Tally Summary Deck No. 13 for kind of tally Code 1 was sorted in order by lumber grade, 4" DIB group, log grade, and species; and minor, intermediate, and major totals of green lumber recovery were accumulated.

The form of Green Lumber Table 5 is:

Mill Scale study no.	Kind of tally	Species	Log grade	4" DIB group	Green lmbr. grade	Green lumber recovery, FBM (1 dec.) by: Lumber grade	4" DIB group	Log grade
xx	1	01	1	07	13	6 x's*		
					14	etc.		
					etc.	etc.	6 x's*	
				08	etc.	etc.	etc.	
				etc.	etc.	etc.	etc.	6 x's*
			2	etc.	etc.	etc.	etc.	etc.
			etc.	etc.	etc.	etc.	etc.	etc.
		02	etc.	etc.	etc.	etc.	etc.	etc.
		etc.	etc.	etc.	etc.	etc.	etc.	etc.

3.2 Rough Dry Lumber. The rough dry lumber was completely tallied, and a rough dry grade was assigned to each board. The log from which each board was sawn was identified for the rough dry lumber. Rough dry lumber was compiled as described in section 3b--Complete Rough Dry Grading, of the Supplement to the Plan; and as modified below.

The rough dry lumber data was transferred from the Lumber Grade and Tally form to the Board Deck No. 12 (described in section 5.(5)). One card was punched for each board. The log control data was gang punched into each card No. 12 from Deck No. 11. The Board Deck No. 12 was separated into two groups: (1) boards for which length and width were recorded and punched; and (2) boards for which surface tally in square feet was recorded and punched. Each group of the Board Deck No. 12 was merged with the Thickness Factor Master Deck No. 88 (described in section 5.(19)), and the rough dry lumber tally was calculated and punched in each Card No. 12.

The Board Deck No. 12 was sorted in order by lumber grade and log number to place all of the cards for a log together in a control group. These cards were tabulated and the rough dry lumber recovery was summed for each log. At the same time, the Initial Lumber Grade and Tally Summary Deck No. 13, kind of tally code 2 (described in section 5.(6)), was summary punched.

The Initial Lumber Grade and Tally Value Deck No. 13x1 (described in section 5.(7)) was reproduced from the deck of card No. 13. The Lumber Grade and Selling Price Master Deck No. 87 (described in section 5.(18)) and the Deck No. 13x1 were merged; and the value of the rough dry lumber was calculated and punched in each card No. 13x1.

The Deck No. 13x1 was sorted in order by lumber grade and log number, and was tabulated to sum the number of rough dry lumber grades, the rough dry lumber recovery, and the value for each log. At this time the Log Value Summary Deck No. 11x1 (described in section 5.(3)) was summary punched. The average value per M feet of the rough dry lumber was calculated and punched in each card No.11x1.

The Deck No. 11x1 and the Log Deck No. 11 were merged; and the rough dry lumber recovery and average lumber value were gang punched into each card No. 11 from Deck No. 11x1. The rough dry percent of the net log scale and the rough dry percent of the green lumber recovery were calculated and punched in each card of Log Deck No. 11.

The Log Value Summary Deck No. 11x1 was sorted in order by 4" DIB group, log grade, and species; and was tabulated to sum the number of logs, small end diameters, rough dry lumber tally, and lumber value for each 4" DIB group. At this time the Log Grade/DIB Group Log Data Summary Deck No. 17 (described in section 5.(11)) was

summary punched. Then, the average small end DIB, average lumber-tally, and average lumber value per M were calculated and punched in each Card No. 17.

The Initial Lumber Grade and Tally Value Deck No. 13x1 was sorted in order by lumber grade, 4" DIB group, log grade, and species; and was tabulated to sum the lumber tally for each lumber grade, and the lumber tally and value for each 4" DIB group. At this time the Log Grade/DIB Group by Lumber Grade and Tally Summary Deck No. 18 (described in section 5.(12)) was summary punched. The Decks No. 17 and No. 18 were merged; and the lumber grade-tally percent of the 4" DIB group-tally was calculated and punched in each Card No. 18.

The Log Grade/DIB Group by Lumber Grade and Tally Summary Deck No. 18 was sorted in order by lumber grade, 4" DIB group, log grades, and species. The cards were listed, as described in section 4.15; the listing showing the lumber grade-tally percent of the 4" DIB group-tally for each lumber grade of each 4" DIB group of each log grade. The lumber grade percents for each 4" DIB group were cumulatively summed, beginning with the lowest grade dimension and summing through the dimension, common, shop, and select grades to the highest grade select.

The cumulative percents for each 4" DIB group and log grade were plotted over the average DIB for the 4" group; a set of lumber recovery cumulative percent curves being prepared for each log grade of each species. These curves were smoothed out and balanced for each 4" DIB group of each log grade. The lumber recovery cumulative percents were read from the balanced curves, at the mid-point of each 4" DIB group, for each lumber grade of each 4" DIB group and log grade. The lumber grade cumulative percents were transposed to straight lumber grade percents and recorded in the Table of Lumber Recovery Percents (described in section 7).

The Lumber Grade Recovery Percent by Log Grade and DIB Group Deck No. 19 (described in section 5.(13)) were punched from the Table of Lumber Recovery Percents. The Cards No. 19 were used as described in section 3.3.

The procedure described above and in section 3.3 differs from that outlined in the Plan and Supplement. The procedure used is based on using lumber recovery percents with Decks No. 19 and No. 20, while that in the Plan and Supplement is based on using lumber recovery footages in the Decks No. 13--Initial Lumber Grade and Tally Summary Card (described in section 5.(6)), No. 14--Final Lumber Grade and Tally by Initial Grade Card (described in section 5.(8)), No. 15--Final Lumber Grade and Tally Summary Card (described in section 5.(9)), and No. 11x2--Surfaced Lumber Recovery per Log Summary Work Card (described in section 5.(4)). Also, the procedure used differs from that

in the Plan and Supplement in that: (1) the lumber value was calculated for each grade with Decks No. 13x1 and No. 87; and summarized and averaged for each log in Deck No. 11x1; and (2) the lumber recovery percentages were calculated by IBM machines using Decks No. 17 and No. 18.

3.3 Surfaced Lumber. The rough dry boards in the surfacing sample were tallied into (gross) and out of (net) the planer by thickness and width groups for each rough dry grade. The boards must be tallied into the planer to make certain that there is no gain or loss in footage due to factors other than surfacing. The log identity of each board was not maintained in this phase of the study.

3.31 Tally and Compilation of Surfacing Sample. The boards in the surfacing sample were tallied by one of three methods and were compiled as described in sections 3.311, 3.312, and 3.313.

3.311 1"x 8" Boards--All Grades. The 1" x 8" boards of all rough dry lumber grades (selects, moulding, and commons) were tallied on conventional lumber tally forms by length classes. The number of boards was tallied in the proper length class of each surfaced lumber grade obtained for each rough dry grade. The number of boards was summarized for each length class and the sum multiplied by the board foot content of a single board of that length class. This was done for all length classes of each surfaced grade for a rough dry grade. The board feet and number of boards of all length classes were summarized to give the total footage and number of boards for the surfaced grade. The total footages and number of boards of each surfaced grade for the rough dry grade were recorded on the Initial Grade to Final Grades Tally as described in sections 3b and 7c of the Supplement to the Plan.

3.312 5/4 Thickness Boards--All Grades. The 5/4-inch thick boards of all rough dry lumber grades (selects, moulding, and shops) were run through the planer in random widths. Therefore, these boards were tallied on conventional lumber tally forms by square foot surface tally classes. The number of boards was tallied in the proper surface tally class of each surfaced lumber grade obtained for each rough dry grade. The number of pieces was summarized for each surface tally class and the sum multiplied by the thickness factor for 5/4 boards to give the board feet. The board feet and number of boards of all surface tally classes were summarized for the surfaced lumber grade. The total footages and number of boards of each surfaced grade for the rough dry grade were recorded on the Initial Grade to Final Grades Tally, as described in sections 3b and 7c of the Supplement to the Plan.

3.313 All Other Boards. All the common (except 1"x 8" common) and dimension boards were tallied on the Lumber Grade and Tally Form. One or more forms were used for each rough dry grade. The following items were recorded for each board: surfaced grade, thickness, width, gross length, and net length. These items were transferred to the Gross and Net Initial to Final Board Deck No. 16 (described in section 5.(10)). The Decks No. 16 and No. 88--Thickness Factor Master were merged; and the gross and net lumber tallies were calculated and punched in each Card No. 16. The Deck No. 16 was summarized to give the sum of the gross and net lumber tallies and the numbers of boards for each surfaced grade of each rough dry grade. The total footages and numbers of boards were transferred to the Initial Grade to Final Grades Tally. This method of compilation is not described in the Plan or the Supplement.

3.32 Summary of Surfacing Sample. One Initial to Final Grades Tally was prepared for the gross and for the net tally of each rough dry lumber grade. The gross and net numbers of pieces and tallies were summarized and balanced. The total net tally for each surfaced lumber grade of each rough dry lumber grade was transferred to the Initial Grade to Final Grades Record (included in section 7d of the Plan), and the percent of rough dry tally was calculated for each surfaced grade. The Initial Lumber Grade to Final Lumber Grades Master Deck No. 89 (described in section 5.(20)) was prepared from the Initial Grade to Final Grades Record. This procedure follows that outlined in section 3b of the Supplement to the Plan.

3.33 Application of the Surfacing Sample. The procedure described in this section is different from that outlined in the Plan and in the Supplement, in that lumber recovery percents are used instead of footages.

The Initial Lumber Grade to Final Lumber Grades Master Deck No. 89 and the Lumber Grade Recovery Percent by Log Grade and DIB Group Deck No. 19 (prepared in section 3.2) were merged; and the final (surfaced) lumber grade recovery percents for each initial (rough dry) lumber grade recovery percent were calculated and punched in each Card No. 19.

The Final Lumber Grade and Recovery Percent by Initial Grade Deck No. 20 (described in section 5.(14)) were reproduced from Card No. 19. One Card No. 20 was made for each surfaced lumber grade in Card No. 19. The Deck No. 20 was summarized to give the sum of the surfaced lumber recovery percents by surfaced lumber grade for each 4" DIB group of each log grade, as described in section 4.21. This summary tabulation includes the percent loss due to surfacing. Therefore, the surfaced lumber grade recovery percentages for each 4" DIB group of each log grade were adjusted to sum to 100 percent excluding loss.

4. LUMBER SUMMARY TABULATIONS

Listings and summary tabulations of rough dry and surfaced lumber data were prepared as described and illustrated below.

4.1 Rough Dry Lumber Tables.

4.11 Rough Dry Lumber Table 1--Number of Boards and Rough Dry Lumber Recovery by Lumber Grade, Log Number, and Species. The Board Deck No. 12 for kind of tally Code 2 was sorted in order by lumber grade, log number, and species; and minor, intermediate, and major totals of the number of boards and the lumber tally were accumulated.

The form of Rough Dry Lumber Table 1 is:

Mill scale study no.	Kind of tally	Species	Log no.	Log grade	4" DIB group	Lumber grade	Lumber grade totals: No. of boards	Lumber grade totals: Tally, FBM (1 dec.)	Log number totals: No. of boards	Log number totals: Tally, FBM (1 dec.)	Species totals: No. of boards	Species totals: Tally, FBM (1 dec.)
xx	2	01	0001	x	xx	11	xxx*	xxxxx*				
						12	etc.	etc.				
						etc.	etc.	etc.	xxxx*	6 x's*		
			0002	x	xx	etc.	etc.	etc.	etc.	etc.		
			etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	xxxxx*	8 x's*
		02	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.
		etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.

4.12 Rough Dry Lumber Table 2--Tally and Value of Rough Dry Lumber by Log. The Initial Lumber Grade and Tally Value Deck No. 13x1 for kind of tally Code 2 was sorted in order by lumber grade, log number, and species; and minor, intermediate, and major totals of lumber tally and value, and intermediate totals of the number of rough dry lumber grades were accumulated.

The form of Rough Dry Lumber Table 2 is:

Mill scale study no.	Kind of tally	Species	Log no.	Lmbr. grade totals: Lumber grade	Lmbr. grade totals: Tally, FBM (1 dec.)	Lmbr. grade totals: Value $ (2 dec.)	Log number totals: No. lumber grades	Log number totals: Tally, FBM (1 dec.)	Log number totals: Value $ (2 dec.)	Species totals: Tally, FBM (1 dec.)	Species totals: Value $ (2 dec.)
xx	2	01	0001	11	xxxx*	xxxxx*					
				12	etc.	etc.					
				etc.	etc.	etc.	xx*	6 x's*	6 x's*		
			0002	etc.	etc.	etc.	etc.	etc.	etc.		
			etc.	etc.	etc.	etc.	etc.	etc.	etc.		
		02	etc.	etc.	etc.	etc.	etc.	etc.	etc.	8 x's*	8 x's*
		etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.

4.13 Rough Dry Lumber Table 3--Tally and Value of Rough Dry Lumber by Log, 4" DIB Group, and Log Grade. The Initial Lumber Grade and Tally Value Deck No. 13x1 for kind of tally Code 2 was sorted in order by lumber grade, log number, 4" DIB group, log grade, and species; the data punched in each card were listed; and minor, intermediate, and major totals of lumber tally and value, and intermediate and major totals of the number of logs were accumulated.

The form of Rough Dry Lumber Table 3 is:

Mill :	:	:	:	:	: Lmbr. :	Lmbr. :	Log totals	:	DIB group totals	:	Log grade totals
scale:Kind :	:	: 4" :	:	: Lum-:	tally	value :	Tally : Value	:	No. : Tally: Value	:	No. : Tally, : Value
study: of	:Spe-: Log : DIB : Log :			: ber :	FBM	$	FBM : $	: logs:	FBM : $	:	logs : FBM : $
no.	:tally:cies:grade:group:			: no. :	grade:(1 dec)	:(2 dec)	:(1 dec) :(2 dec)	:	:(1 dec) :(2 dec)	:	:(1 dec) :(2 dec)
xx	2	01	1	07	xxxx	11	xxxx	xxxxx			
						12	etc.	etc.			
						etc.	etc.	etc.	6 x's*	6 x's*	
					xxxx	etc.	etc.	etc.	etc.	etc.	
					etc.	etc.	etc.	etc.	xxx*	8 x's*	8 x's*
				08	etc.	etc.	etc.	etc.	etc.	etc.	
				etc.	etc.	etc.	etc.	etc.	etc.	etc.	xxxx* 8 x's* 8 x's*
			2	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc. etc. etc.
			etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc. etc. etc.
		02	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc. etc. etc.
		etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc. etc. etc.

4.14 Rough Dry Lumber Table 4--Averages and Totals of Small End DIB, Lumber Tally, and Lumber Value by 4" DIB Group, Log Grade, and Species. The Log Grade/DIB Group Log Data Summary Deck No. 17 for kind of tally Code 2 was sorted in order by 4" DIB group, log grade, and species; the data punched in each card were listed; and minor and intermediate totals of the number of logs, small end DIB, lumber tally, and lumber value were accumulated.

The form of Rough Dry Lumber Table 4 is:

Mill scale study no.	Kind of tally	Species	Log grade	4" DIB group	No. of logs	Total small end DIB ins. (1 dec)	Tot. Lbr. Tally, FBM (1 dec)	Total value $ (2 dec.)	Avg. sm. end DIB ins. (1 dec)	Avg. lbr tally FBM (1 dec)	Avg. lbr value/M $ (2 dec)	Minor Totals:	Intermediate totals
xx	2	01	1	07	xxx	xxxx	6 x's	7 x's	xxx	xxxxx	xxxxx		
				08	etc.	etc.	etc.	etc.	etc.	etc.	etc.		
			etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	min.tot.	
			2	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	
			etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	Int.tot.
			02	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.
			etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.

The data punched in each card were listed as indicated by the above headings. In addition, minor and intermediate totals were printed as indicated below:

	No. of logs	Small end DIB, ins. (1 dec)	Lumber tally FBM (1 dec.)	Lumber value $ (2 dec.)		No. of logs	Small end DIB, ins. (1 dec)	Lumber tally FBM (1 dec)	Lumber value $ (2 dec)
End of listing for a log grade	6 x's*	6 x's*	8 x's*	10 x's*					
End of listing for a species						6 x's*	6 x's*	8 x's*	10 x's*

4.15 Rough Dry Lumber Table 5--Rough Dry Lumber Recovery and Percents by Lumber Grade, DIB Group, Log Grade, and Species. The Log Grade/DIB Group by Lumber Grade and Tally Summary Deck No. 18 for kind of tally Code 2 was sorted in order by lumber grade, 4" DIB group, log grade, and species; the data punched in each card were listed; and minor totals of the lumber grade percents, and minor, intermediate, and major totals of the lumber tally were accumulated.

The form of Rough Dry Lumber Table 5 is:

Mill scale study no.	Kind of tally	Species	Log grades	4" DIB group	Lmbr. grade	Lumber tally FBM (1 dec)	Lumber grade % (3 dec)	DIB group totals: Lbr.gr. % (3 dec)	DIB group totals: Lbr.tally FBM (1 dec)	Log grade total: Lumber tally FBM (1 dec.)	Species total: Lumber tally FBM (1 dec.)
xx	2	01	1	07	11	6 x's	xxxx				
					etc.	etc.	etc.	xxxx*	8 x's*		
				08	etc.	etc.	etc.	etc.	etc.		
				etc.	etc.	etc.	etc.	etc.	etc.	8 x's*	
			2	etc.	etc.	etc.	etc.	etc.	etc.	etc.	
			etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	8 x's*
		02	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.
		etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.

4.16 Rough Dry Lumber Table 6--Curved Rough Dry Lumber Recovery Percents by Lumber Grade, DIB Group, Log Grade, and Species. The lumber grade recovery percent by log grade and DIB group Deck No. 19 for kind of tally Code 2 was sorted in order by lumber grade, 4" DIB group, log grade and species; the data punched in each card were listed; and minor totals of the lumber recovery percents were accumulated.

The form of Rough Dry Lumber Table 6 is:

Mill scale study no.	Kind of tally	Species	Log grade	4" DIB group	Lmbr. grade	Lmbr. recov. % (3 dec)	Total lumber recovery - % for 4" DIB group (3 dec)
xx	2	01	1	07	11	xxxx	
					12	etc.	
					etc.	etc.	xxxx
				08	etc.	etc.	etc.
				etc.	etc.	etc.	etc.
			2	etc.	etc.	etc.	etc.
			etc.	etc.	etc.	etc.	etc.
		02	etc.	etc.	etc.	etc.	etc.
		etc.	etc.	etc.	etc.	etc.	etc.

4.2 Surfaced Lumber Tables.

4.21 Surfaced Lumber Table 1--Surfaced Lumber Recovery Percents by Lumber Grade, DIB Group, Log Grade, and Species. The final lumber grade and recovery percent by initial grade Deck No. 20 for final kind of tally code 3 was sorted in order by final lumber grade, 4" DIB group, log grade and species; the data punched in each card were listed; and minor totals of the lumber recovery percents were accumulated.

The form of Surfaced Lumber Table 1 is:

Mill scale study no.	Kind of tally	Species	Log grade	4" DIB group	Surfaced lumber grade	Lumber recovery percents (3 dec.)	Sum of lumber recovery percents by 4" DIB group (3 dec.)
xx	3	01	1	07	11	xxxx	
					12	etc.	
				etc.	etc.	etc.	xxxx
				08	etc.	etc.	etc.
				etc.	etc.	etc.	etc.
			2	etc.	etc.	etc.	etc.
		02	etc.	etc.	etc.	etc.	etc.
		etc.	etc.	etc.	etc.	etc.	etc.

5. IBM CARD DECK DESCRIPTIONS

The IBM Card decks proposed for use in compiling the mill scale study data are described in section 5--Punch Cards Required, of the Plan and Supplement. However, due to the addition of new items of data and to the revisions in the method of compilation, the original IBM Card decks were revised in form and content and expanded in number. Therefore, to avoid misunderstanding, the IBM Card decks are described in their final form in this section.

Each deck of IBM Cards is identified by a deck number which is punched in each card. This number distinguishes one deck from another and positively identifies the cards for each step of the compilation procedure. The IBM Card decks required for the compilation of the Mill Scale Study data are:

Deck No.	Deck Name
11	Log deck
11(12)2	Green lumber recovery per log summary work deck
11x1	Log value summary deck (rough dry lumber)
11x2	Surfaced lumber recovery per log summary work deck
12	Board deck
13	Initial lumber grade and tally summary deck
13x1	Initial lumber grade and tally value deck
14	Final lumber grade and tally by initial grade deck
15	Final lumber grade and tally summary deck
16	Gross and net initial to final board deck
17	Log grade/DIB group log data summary deck
18	Log grade/DIB group by lumber grade and tally summary deck
19	Lumber grade recovery percent by log grade and DIB group deck
20	Final lumber grade and recovery percent by initial grade deck
21	International 1/4" BF volume and cubic foot volume log deck
85	Cubic log volume calculation master deck
86	International 1/4" log rule master deck
87	Lumber grade selling price master deck
88	Thickness factor master deck
89	Initial lumber grade to final lumber grades master deck

The Card decks are described in the same order as they are listed above. The description includes the source of the data, the method of punching, the purpose of the deck, the card stock, and corner cut, and the data to be punched in each card column.

5.(1) No. 11 - Log Deck

Key punched and verified from the Log Scale (Form # 26). The net percent of gross scale was calculated. The green lumber recovery was gang punched from the Green Lumber Recovery per Log Summary Work Deck No. 11(12)2. The rough dry lumber recovery and value were gang punched from the Log Value Summary Deck No. 11x1. The surfaced lumber recovery would be gang punched from the Surfaced Lumber Recovery per Log Summary Work Deck No. 11x2. The lumber recovery percentages were calculated.

The Log Deck No. 11 was used to prepare the Board Deck No. 12 and the International $\frac{1}{4}$" BF Volume and Cubic Foot Volume Log Deck No. 21. This deck also was used to prepare Log Tables 1 and 2; and Green Lumber Table 2.

This deck consists of solid color E-green cards (IBM stock form # 733727) with a top right corner cut.

The description of the Log Deck No. 11 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Log number
9	Log grade
10-11	Species
12-13	4-inch diameter group (small end)
14-15	Log length, feet (0 dec.)
16-17	Diameter, large end, i.b., inches (0 dec.)
18-19	Diameter, small end, i.b., inches (0 dec.)
20-22	Gross scale, Dec. C.
23-25	Net scale, Dec. C
26-28	Number of boards sawn from log
29-32	Net percent of gross scale (3 dec.)
33-37	Green lumber recovery, FBM (1 dec.)
38-41	Green lumber percent of net log scale (3 dec.)
42-46	Rough dry lumber recovery, FBM (1 dec.)
47-50	Rough dry lumber percent of net log scale (3 dec.)
51-54	Rough dry lumber percent of green lumber recovery (3 dec.)
55-59	Surfaced lumber recovery, FBM (1 dec.)
60-63	Surfaced lumber percent of net log scale (3 dec.)
64-67	Surfaced lumber percent of green lumber recovery (3 dec.)
68-71	Surfaced lumber percent of rough dry lumber recovery (3 dec.)
72-76	Average value of rough dry lumber per M, $ (2 dec.)
77-80	Blank columns
	X Punches
60	Control X punch
	12 Punches
30	Control 12 punch

5.(2) No. 11(12)2- Green Lumber Recovery per Log Summary Work Deck. Summary punched from the Initial Lumber Grade and Tally Summary Deck No. 13 (kind tally Code 1). This deck was used in the preparation of the Log Deck No. 11.

This deck consists of plain manila-A cards (IBM stock form # 733727) with a top left corner cut.

The description of the Green Lumber Recovery per Log Summary Work Deck No. 11(12)2 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Log number
9	Log grade
10-11	Species
12-13	4" DIB group
14	Kind tally
15	Blank column
16-17	DIB large end
18-19	DIB small end
20-32	Blank columns
33-37	Green lumber tally, FBM (1 dec.)
38-39	Number of green grades per log
40-80	Blank columns
	X Punches
80	Control X punch
	12 Punches
2	Identifying 12 punch

5.(3) No. 11x1 - Log Value Summary Deck.

Summary punched from the Initial Lumber Grade and Tally Value Deck No. 13x1 (kind tally Code 2). Average lumber value/M was calculated. This deck was used in the preparation of the Log Deck No. 11 and the Log Grade/DIB Group Log Data Summary Deck No. 17.

This deck consists of plain manila-A cards (IBM stock form # 733727) with a top left corner cut.

The description of the Log Value Summary Deck No. 11X1 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Log number
9	Log grade
10-11	Species
12-13	4" DIB group
14	Kind tally
15	Blank column
16-17	DIB large end
18-19	DIB small end
20-41	Blank columns
42-46	Total rough dry lumber tally, FBM (1 dec.)
47-51	Total lumber value, $ (2 dec.)
52-53	Number of lumber grades
54-71	Blank columns
72-76	Average lumber value, $ (2 dec.)
78-80	Blank columns

X Punches

1	Identifying X punch
80	Control X punch

12 Punches

5.(4) No. 11X2 - Surfaced Lumber Recovery per Log Summary Work Deck. This deck would be summary punched from the Final Lumber Grade and Tally Summary Deck No. 15 (kind tally Code 3). The deck would be used to complete the surfaced lumber part of the Log Deck No. 11.

This deck would consist of plain manila -A Cards (IBM stock form #733727) with a top left corner cut.

The description of the Surfaced Lumber Recovery per Log Summary Work Deck No. 11X2 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Log number
9	Log grade
10-11	Species
12-13	4" DIB group
14	Kind tally
15	Blank column
16-17	DIB large end
18-19	DIB small end
20-54	Blank columns
55-59	Surfaced lumber tally, FBM (1 dec.)
60-61	Number of surfaced grades per log
62-80	Blank columns

X Punches

2	Identifying X punch
30	Control X punch

12 Punches

5.(5) No. 12 - Board Deck. Key punched and verified from the Lumber Grade and Tally form for rough dry (or green) boards. The log control data were gang punched using the Log Deck No. 11. The lumber tally was calculated using the Thickness Factor Master Deck No. 88. The board value could be calculated using the Lumber Grade Selling Price Master Deck No. 87.

This deck was used to prepare the Initial Lumber Grade and Tally Summary Deck No. 13 for rough dry lumber. It also was used to prepare Rough Dry Lumber Table 1.

This deck consists of plain manila -A Cards (IBM stock form # 733727) with a top left corner cut.

The description of the Board Deck No. 12 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Log number
9	Log grade
10-11	Species
12-13	4-inch Diameter group (small end)
14	Kind of grade and tally
15-16	Lumber grade
17-20	Lumber tally, FBM (1 dec.)
21-24	Surface tally, Sq. Ft. (1 dec.)
25	Thickness (code)
26-27	Width, inches (0 dec.)
28-29	Length, feet (0 dec.)
30	Sample board code
31-37	Blank columns
38-41	Result of multiplying width X length (0 dec.)
42-80	Blank columns

X Punches

34	Control X punch

12 Punches

5.(6) No. 13 - Initial Lumber Grade and Tally Summary Deck. Green Lumber: Key punched and verified from the Green Lumber Grades and Tally forms. The deck was used to prepare the Green Lumber Recovery per Log Summary Work Deck No. 11(12)2; and to prepare the summary tabulations for Green Lumber Tables 1, 3, 4 and 5.

Rough Dry Lumber: Summary punched from the Board Deck No. 12 (kind tally Code 2). The deck was used to prepare the Initial Lumber Grade and Tally Value Deck No. 13X1.

Surfaced Lumber: This deck could be used in calculating the surfaced lumber grade footages recovered from the rough dry grade, using the Initial Lumber Grade to Final Lumber Grades Master Deck No. 89. The deck also could be used to prepare the Final Lumber Grade and Tally by Initial Grade Deck No. 14.

Deck No. 13 consists of manila -A Cards (IBM stock form # 733727) with a P-green top stripe and a left top corner cut.

The description of the Initial Lumber Grade and Tally Summary Deck No. 13 is:

Deck No. 13 (continued)

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Log number
9	Log grade
10-11	Species
12-13	4-inch Diameter group (small end)
14	Kind of grade and tally, initial
15-16	Lumber grade, initial
17-20	Lumber tally, initial, FBM (1 dec.)
21	Kind of grade and tally, final

Final Lumber Grades from Initial Lumber Grade:

	NX 79 Cards	X 79 Cards
22-23	Grade, first	Grade, tenth
24-25	Grade, second	Grade, eleventh
26-27	Grade, third	Grade, twelfth
28-29	Grade, fourth	
30-31	Grade, fifth	
32-33	Grade, sixth	
34-35	Grade, seventh	
36-37	Grade, eighth	
38-39	Grade, ninth	

Final Lumber Tally by final lumber grade from initial lumber grade and tally, FBM (1 dec.):

	NX 79 Cards	X 79 Cards
40-43	Tally for first grade	Tally for tenth grade
44-47	Tally for second grade	Tally for eleventh grade
48-51	Tally for third grade	Tally for twelfth grade
52-55	Tally for fourth grade	
56-59	Tally for fifth grade	
60-63	Tally for sixth grade	
64-67	Tally for seventh grade	
68-71	Tally for eighth grade	
72-75	Tally for ninth grade	
76-78	Decimal accumulation for LT1 to LT5 (3 dec.)	
79	Number of final grades for initial grades	
80	Blank column	

X Punches

79	Identifying X punch for card 13 of initial grades that have more than 9 final grades for cards with grades 10 to 18.
80	Control X punch.

12 Punches

79	Identifying 12 punch for initial grades that have more than 9 final grades, for cards with grades 1 to 9.

5.(7) No. 13X1 - Initial Lumber Grade and Tally Value Deck. Rough Dry Lumber: Reproduced from the Initial Lumber Grade and Tally Summary Deck No. 13 (kind tally code 2). The lumber value was calculated using the lumber grade selling price Master Deck No. 87. This deck was used to prepare the Log Value Summary Deck No. 11X1; the Log Grade/DIB Group by Lumber Grade and Tally Summary Deck No. 18; and to prepare the summary tabulations for Rough Dry Lumber Tables 2 and 3.

The deck consists of manila -A Cards (IBM stock form #733727) with a K-red top stripe and a top left corner cut.

The description of the Initial Lumber Grade and Tally Value Deck No. 13X1 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Log number
9	Log grade
10-11	Species
12-13	4-inch Diameter group (small end)
14	Kind of grade and tally, initial
15-16	Lumber grade, initial
17-20	Lumber tally, initial, FBM (1 dec.)
21-41	Blank columns
42-46	Lumber value, initial grade, $ (2 dec.)
47-80	Blank columns
	X Punches
1	Identifying X punch
80	Control X punch
	12 Punches

5.(8) No. 14 - Final Lumber Grade and Tally by Initial Grade Deck. Surfaced Lumber: This deck could be reproduced from the Initial Lumber Grade and Tally Summary Deck No. 13 (kind tally Code 2). The deck would be used to prepare the Final Lumber Grade and Tally Summary Deck No. 15.

This deck would consist of plain manila -A Cards (IBM stock form #733727) with a top left corner cut.

The description of the Final Lumber Grade and Tally by Initial Grade Deck No. 14 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Log number
9	Log grade
10-11	Species
12-13	4-inch Diameter group (small end)
14	Kind of grade and tally, initial
15-16	Lumber grade, initial
17-20	Blank columns
21	Kind of grade and tally, final
22-23	Lumber grade, final
24-27	Lumber tally, final, FBM (1 dec.)
28-78	Blank columns
79	Number of final grades for initial grade
80	Final grade number
	X Punches
30	Control X punch
79	Identifying X punch for initial grades that have more than 9 final grades, for cards with grades 10 to 18.
80	Identifying X punch for final grades 10 to 18.
	12 Punches
79	Identifying 12 punch for initial grades that have more than 9 final grades, for cards with grades 1 to 9.

5.(9) No. 15 - Final Lumber Grade and Tally Deck.
Surfaced Lumber: This deck could be summary punched from the Final Lumber Grade and Tally by Initial Grade Deck No. 14. The deck would be used to prepare the Surfaced Lumber Recovery per Log Summary Work Deck No. 11X2.

This deck would consist of solid color B-red cards (IBM stock form #733727) with a top left corner cut.

The description of the Final Lumber Grade and Tally Deck No. 15 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Log number
9	Log grade
10-11	Species
12-13	4-inch Diameter group (small end)
14	Kind of grade and tally,final
15-16	Lumber grade, final
17-20	Lumber tally final, FBM (1 dec.)
21-80	Blank columns

X Punches

34	Control X punch

12 Punches

5.(10) No. 16 - Gross and Net Initial to Final Board Deck.
Key punched and verified from the Lumber Grade and Tally forms for the surfacing sample. The gross and net lumber tallies were calculated using the Thickness Factor Master Deck No. 88. This deck was used to prepare summary tabulations, of the gross and net lumber tally and number of boards by surfaced lumber grades for each initial lumber grade, from which the Initial Grade to Final Grades Tally forms were prepared in part.

This deck consists of plain manila -A cards (IBM stock form #733727) with a top left corner cut.

The description of the Gross and Net Initial to Final Board Deck No. 16 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-9	Blank columns
10-11	Species
12-13	Blank columns
14	Initial tally
15-16	Initial grade
17-20	Blank columns
21	Final tally
22-23	Final grade
24	Blank column
25	Thickness
26-27	Width, inches (0 dec.)
28-29	Length--gross, feet (0 dec.)
30-31	Length--net, feet (0 dec.)
32-37	Blank columns
38-41	Result of GROSS width X length multiplication (0 dec.)
42-45	Result of NET width X length multiplication (0 dec.)
46-49	GROSS lumber tally, FBM (1 dec.)
50-53	NET lumber tally, FBM (1 dec.)
	X Punches
80	Control X Punch
	12 Punches

5.(11) No. 17 - Log Grade/DIB Group Log Data Summary Deck. Summary punched from the Log Value Summary Deck No. 11X1 (kind tally Code 2). The average small end DIB, lumber tally, and lumber value per M were calculated. This deck was used in the preparation of the Log Grade/DIB Group by Lumber Grade and Tally Summary Deck No. 18; and to prepare the summary tabulation for Rough Dry Lumber Table 4.

The deck consists of plain manila -A cards (IBM stock form # 733727) with a top right corner cut.

The description of the Log Grade/DIB Group Log Data Summary Deck No. 17 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Blank columns
9	Log grade
10-11	Species
12-13	4-inch DIB group
14	Kind tally
15-17	Number of logs
18-21	Total small end DIB, inches (0 dec.)
22-27	Total lumber tally, FBM (1 dec.)
28-34	Total lumber value, $ (2 dec.)
35-37	Average small end DIB, inches (1 dec.)
38-42	Average lumber tally, FBM (1 dec.)
43-47	Average lumber value, $ (2 dec.)
48-80	Blank columns
	X Punches
80	Control X punch
	12 Punches
77	Control 12 punch

5.(12) No. 18 - Log Grade/DIB Group by Lumber Grade and Tally Summary Deck. Summary punched from the Initial Lumber Grade and Tally Value Deck No. 13X1 (kind tally Code 2). The lumber recovery percents were calculated using the Log Grade/DIB Group Log Data Summary Deck No. 17. The deck was used to prepare Rough Dry Lumber Table 5.

This deck consists of manila -A cards (IBM stock form # 733727) with an M-Blue top stripe and a top left corner cut.

The description of the Log Grade/DIB Group by Lumber Grade and Tally Summary Deck No. 18 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Blank columns
9	Log grade
10-11	Species
12-13	4-inch DIB group
14	Initial kind tally
15-16	Initial lumber grade
17-22	Lumber tally, FBM (1 dec.)
23-25	Number of logs
26-29	Lumber tally percent of total tally in DIB group (3 dec.)
30-80	Blank columns
	X Punches
60	Control X punch
	12 Punches
76	Control 12 punch

5.(13) No. 19 - Lumber Grade Recovery Percent by Log Grade and DIB Group Deck. Key punched and verified from the Table of Lumber Recovery Percents (kind tally 2). The final lumber recovery percents were calculated using the Initial Lumber Grade to Final Lumber Grades Master Deck No. 89. This deck was used to prepare the Final Lumber Grade and Recovery Percent by Initial Grade Deck No. 20; and to prepare the Rough Dry Lumber Table 6.

The deck consists of manila -A cards (IBM stock form # 733727) with a T-yellow top stripe and a top left corner cut.

The description of the Lumber Grade Recovery Percent by Log Grade and DIB Group Deck No. 19 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Blank columns
9	Log grade
10-11	Species
12-13	4-inch DIB group
14	Initial kind tally
15-16	Initial lumber grade
17-20	Initial lumber recovery percent (3 dec.)
21	Final kind tally

Final lumber grades from initial lumber grade:

	NX79 Cards	X 79 Cards
22-23	Grade 1st	Grade 10th
24-25	Grade 2nd	Grade 11th
26-27	Grade 3rd	Grade 12th
28-29	Grade 4th	Grade 13th
30-31	Grade 5th	Grade 14th
32-33	Grade 6th	Grade 15th
34-35	Grade 7th	Grade 16th
36-37	Grade 8th	Grade 17th
38-39	Grade 9th	Grade 18th

Deck No. 19 (continued)

Final lumber recovery percents from initial lumber recovery percent (3 dec.):

	NX79 Cards	X 79 Cards
40-43	Percent for: 1st Grade	10th Grade
44-47	Percent for: 2nd Grade	11th Grade
48-51	Percent for: 3rd Grade	12th Grade
52-55	Percent for: 4th Grade	13th Grade
56-59	Percent for: 5th Grade	14th Grade
60-63	Percent for: 6th Grade	15th Grade
64-67	Percent for: 7th Grade	16th Grade
68-71	Percent for: 8th Grade	17th Grade
72-75	Percent for: 9th Grade	18th Grade
76-78	Decimal accumulation for percents 1 to 5.	
79	Number of final grades for initial grade.	

X Punches

80	Control X punch
79	Identifying X punch for Card 19 of initial grades that have more than 9 final grades, for cards with grades 10 to 18.

12 Punches

79	Identifying 12 punch for Card 19 of initial grades that have more than 9 final grades, for cards with grades 1 to 9.

5.(14) No. 20 - Final Lumber Grade and Recovery Percent by Initial Grade Deck. Reproduced from the Lumber Grade Recovery Percent by Log Grade and DIB Group Deck No. 19. This deck was used to prepare the Surfaced Lumber Table 1.

The deck consists of solid color C-salmon cards (IBM stock form #733727) with a top left corner cut.

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Blank columns
9	Log grade
10-11	Species
12-13	4-inch DIB group
14	Initial kind of tally
15-16	Initial lumber grade
17-20	Blank columns
21	Final kind of tally
22-23	Final lumber grade
24-27	Final lumber recovery percent (3 dec.)
28-78	Blank columns
79	Number of final grades for initial grade
80	Final grade number
	X Punches
30	Control X punch
79	Identifying X punch for initial grades that have more than 9 final grades, for cards with grades 10 to 18.
80	Identifying X punch for final grades 10 to 18.
	12 Punches
79	Identifying 12 punch for initial grades that have more than 9 final grades, for cards with grades 1 to 9.

5.(15) No. 21 - International $\frac{1}{4}$" BF Volume and Cubic Foot Volume Log Deck. Reproduced from the Log Deck No. 11. International $\frac{1}{4}$" b.f. gross volume was gang punched from the International $\frac{1}{4}$" Log Rule Master Deck No. 86, and the Int. $\frac{1}{4}$" b.f. net volume was calculated. The cubic foot gross volume was calculated using the Cubic Log Volume Calculation Master Deck No. 85. This deck was used to prepare Log Table 3.

The deck consists of solid color F-brown cards (IBM stock form #733727) with a top left corner cut.

The description of the International $\frac{1}{4}$" BF Volume and Cubic Foot Volume Log Deck No. 21 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-8	Log number
9	Log grade
10-11	Species
12-13	4" DIB group
14-15	Log length, Feet
16-17	Large end DIB, inches
18-19	Small end DIB, inches
20-22	Gross log scale, Scribner Dec. C
23-25	Net log scale, Scribner Dec. C
26-28	Number of boards sawn from log
29-32	Net percent of gross Scribner scale (3 dec.)
33-37	Green lumber recovery, FBM (1 dec.)
38-41	G.L.R. percent of net Scribner log scale (3 dec.)
42-45	Gross log scale, Int. $\frac{1}{4}$" BF
46-49	Net Log Scale, Int. $\frac{1}{4}$" BF
50-55	Log Gross Cubic Foot Volume (2 dec.)
56-80	Blank columns

X Punches

60	Control X punch
80	Identifying X punch for butt logs

12 Punches

30	Control 12 punch

5.(16) No. 85 - Cubic Log Volume Calculation Master Deck. This single master card was key punched and verified with the cubic calculation factor of .01090831, derived in section 2. This card was used in calculating the cubic foot gross volume for the International $\frac{1}{4}$" BF Volume and Cubic Foot Volume Log Deck No. 21.

The card consists of a plain J-natural master card (IBM stock form # 733727) with a top right corner cut.

The description of the Cubic Log Volume Calculation Master Deck No. 85 is:

Punching card columns	Field
1-2	Card number
3-10	Cubic calculation factor (8 dec.)
11-80	Blank columns
	X Punches
70	Control X punch
	12 Punches
75	Control 12 punch

There is only 1 card in this deck. The cubic calculation factor = .01090831.

This factor = $\frac{3.1415926}{288}$

5.(17) No. 86 - International $\frac{1}{4}$" Log Rule Master Deck. Key punched and verified from a table of International $\frac{1}{4}$" log rule giving the volume of logs by diameter and length classes. This deck was used to prepare the International $\frac{1}{4}$" BF Volume and Cubic Foot Volume Log Deck No. 21.

The deck consists of plain J-natural master cards (IBM stock form #733727) with a top right corner cut.

The description of the International $\frac{1}{4}$" Log Rule Master Deck No. 86 is:

Punching card columns	Field
1-2	Card number
3-13	Blank columns
14-15	Log length, feet
16-17	Blank columns
18-19	DIB, inches, small end
20-41	Blank columns
42-45	International $\frac{1}{4}$" volume
46-80	Blank columns
	X Punches
34	Control X
	12 Punches
65	Control 12

5.(18) No. 87 - Lumber Grade Selling Price Master Deck. Key punched and verified from the Table of Lumber Grade Selling Prices. The deck was used in the calculation of the lumber value in the Initial Lumber Grade and Tally Value Deck No. 13X1.

This deck consists of J-natural master cards (IBM stock form #733727) with an M-blue top stripe and a top right corner cut.

The description of the Lumber Grade Selling Price Master Deck No. 87 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-9	Blank columns
10-11	Species
12-13	Blank columns
14	Kind of tally
15-16	Lumber grade
17-46	Blank columns
47-51	Lumber grade selling price, $ and ¢ (2 dec.)
52-80	Blank columns
	X Punches
60	Control X Punch
	12 Punches
68	Control 12 Punch

5.(19) No. 88 - Thickness Factor Master Deck. Key punched and verified with the thickness factors from section 6b(36) of the Supplement to the Plan. This deck was used in calculating the lumber tally for the Board Deck No. 12 and for the Gross and Net Initial to Final Board Deck No. 16.

The deck consists of J-natural master cards (IBM stock form # 733727) with an X-gray top stripe and a top right corner cut.

The description of the Thickness Factor Master Deck No. 88 is:

Punching card columns	Field
1-2	Card number
3-24	Blank columns
25	Thickness code
26-30	Blank columns
31-34	Thickness factor when length and width are punched for each board and surface tally is not punched (4 dec.)
35-37	Thickness factor when surface tally (sq. ft.) is punched for each board and length and width are not punched (2 dec.)
38-80	Blank columns
	X Punches
60	Control X punch
	12 Punches
65	Control 12 punch

5.(20) No. 89 - Initial Lumber Grade to Final Lumber Grades Master Deck. Key punched and verified from the Initial Grade to Final Grades Record. The deck was used to calculate the final lumber recovery percents in the Lumber Grade Recovery Percent by Log Grade and DIB Group Deck No. 19; and could be used to calculate the final lumber tallies in the Initial Lumber Grade and Tally Summary Deck No. 13.

This deck consists of plain J-natural master cards (IBM stock form #733727) with a top right corner cut.

The description of the Initial Lumber Grade to Final Lumber Grades Master Deck No. 89 is:

Punching card columns	Field
1-2	Card number
3-4	Mill scale study number
5-9	Blank columns
10-11	Species
12-13	Blank columns
14	Kind of grade and tally, initial
15-16	Lumber grade, initial
17-20	Blank columns

Final Lumber Grades and Percents of Initial Tally:

21	Kind of grade and tally	
	NX 79 Cards	X 79 Cards
22-23	First grade	Tenth grade
24-25	Second grade	Eleventh grade
26-27	Third grade	Twelfth grade
28-29	Fourth grade	Thirteenth grade
30-31	Fifth grade	Fourteenth grade
32-33	Sixth grade	Fifteenth grade
34-35	Seventh grade	Sixteenth grade
36-37	Eighth grade	Seventeenth grade
38-39	Ninth grade	Eighteenth grade
	NX 79 Cards	X 79 Cards
40-42	Percent in first (3 dec.)	Percent in tenth (3 dec.)
43-45	Percent in 2nd (3 dec.)	Percent in 11th (3 dec.)
46-48	Percent in third (3 dec.)	Percent in 12th (3 dec.)
49-51	Percent in 4th (3 dec.)	Percent in 13th (3 dec.)
52-54	Percent in fifth (3 dec.)	Percent in 14th (3 dec.)
55-57	Percent in 6th (3 dec.)	Percent in 15th (3 dec.)
58-60	Percent in 7th (3 dec.)	Percent in 16th (3 dec.)
61-63	Percent in 8th (3 dec.)	Percent in 17th (3 dec.)
64-66	Percent in ninth (3 dec.)	Percent in 18th (3 dec.)
67-78	Blank columns	
79	Number of final grades for initial grade	
80	Blank column	

X Punches

12	Control X punch
79	Identifying X punch for Initial grades with more than 9 Final Grades, for cards with grades 10 to 18

12 Punches

78	Control 12 punch
79	Identifying 12 punch for Initial grades with more than 9 Final grades, for cards with grades 1 to 9.

6. CODING AND CODES

The codes used in compiling the mill scale study data are given in section 6 of the Plan and Supplement. The Deck or Card Number of section 6b(1) now include all of the card decks described in section 5 of this Summary.

The species codes given in section 6b(5) of the Plan were used with the Dinuba Mill Scale Study. Since this study was completed, new standard species codes have been prepared for use in the west. The complete list of these standard species codes is given below:

The standard species code is recorded as a two-digit number. If local combinations of two or more of the coded species or genera are desired, the code number of the most important species or genera in the sub group can be used. The species codes by species group and sub groups are:

1 - Softwoods

00 - Douglas-fir--Redwood (00 to 09)

- 01 Douglas-fir (Pseudotsuga menziesii)
- 02 Bigcone Douglas-fir (P. macrocarpa)
- 03
- 04
- 05 Redwood (Sequoia sempervirens)
- 06 Giant Sequoia (S. gigantea)
- 07
- 08
- 09

Pine (10 to 29)

- 10 Major Pines (10 to 19)
- 11 Ponderosa pine (Pinus ponderosa)
- 11 Arizona pine (P. ponderosa var. arizonica)
- 12 Jeffrey pine (P. jeffreyi)
- 13 Sugar pine (P. lambertiana)
- 14 Western white pine (P. monticola)
- 15 Lodgepole pine (P. contorta)
- 16
- 17
- 18
- 19

Species (Softwoods) (cont.)

20 Minor Pines (20 to 29)

21 Coulter pine (Pinus coulteri)
22 Monterey pine (P. radiata)
23 Digger pine (P. sabiniana)
24 Knobcone pine (P. attenuata)

25 Bishop pine (P. muricata)
25 Torrey pine (P. torreyana)
25 Washoe pine (P. washoensis)

26 Apache pine (P. engelmannii)
26 Bristlecone pine (P. aristata)
26 Chihuahua pine (P. leiophylla var. chihuahua)
26 Foxtail pine (P. balfouriana)
26 Limber pine (P. flexilis)
26 Whitebark pine (P. albicaulis)

27 Pinyon (P. edulis)
27 Mexican pinyon (P. cembroides)
27 Parry pinyon (P. quadrifolia)
27 Singleleaf pinyon (P. monophylla)

28
29

30 True Firs (30-39)

31 White fir (Abies concolor)
32 California red fir (A. magnifica)
32 Shasta red fir (A. magnifica var. shastensis)
33 Grand fir (A. grandis)
34 Pacific silver fir (A. amabilis)
35 Noble fir (A. procera)
36 Subalpine fir (A. lasiocarpa)
36 Corkbark fir (A. lasiocarpa var. arizonica)
37 Bristlecone fir (A. bracteata)
38
39

Species (Softwoods) (cont.)

40 Spruce--Hemlock (40-49)

41 Englemann spruce (Picea engelmannii)
42 Sitka spruce (P. sitchensis)
43 Black spruce (P. mariana)
44 White spruce (P. glauca)
44 Parsild spruce (P. glauca var. parsildii)
45 Blue spruce (P. pungens)
46 Brewer spruce (P. breweriana)
47 Mountain hemlock (Tsuga mertensiana)
48 Western hemlock (T. heterophylla)
49

50 Cedar--Larch (50-59)
51 Incense-cedar (Libocedrus decurrens)
52 Alaska cedar (Chamaecyparis nootkatensis)
53 Port-Orford cedar (C. lawsoniana)
54 Western redcedar (Thuja plicata)

55 Western larch (Larix occidentalis)
56 Subalpine larch (L. lyallii)
57 Tamarack (L. laricina)
58
59

60 Other Softwoods (60-69)

61 California torreya (Torreya californica)
62 Pacific yew (Taxus brevifolia)

63 Alligator juniper (Juniperus deppeana)
63 California juniper (J. californica)
63 Common juniper (J. communis)
63 Eastern redcedar (J. virginiana)
63 One-seed juniper (J. monosperma)
63 Pinchot juniper (J. pinchotii)
63 Rocky Mountain juniper (J. scopulorum)
63 Utah juniper (J. osteosperma)
63 Western juniper (J. occidentalis)

64 Arizona cypress (Cupressus arizonica)
64 Gowan cypress (C. goveniana)
64 Mac Nab cypress (C. macnabiana)
64 Modoc cypress (C. bakeri)
64 Monterey cypress (C. macrocarpa)
64 Tecate cypress (C. guadalupensis)
65
66
67
68
69

Species (cont.)

3 - Hardwoods

70 Soft textured hardwoods (70-79)

71 Alder
   All Alnus spp.
72 Ash
   All Fraxinus spp.
73 Aspen
   Quaking aspen (Populus tremuloides)
74 Birch
   All Betula spp.
75 Cottonwood
   All Populus spp. except P. tremuloides
76 Maple
   All Acer spp.
77 Willow
   All Salix spp.
78
79

Oaks (80-89)

81 California black oak (Quercus kelloggii)
82 California live oak (Q. agrifolia)
83 California white oak (Q. lobata)
84 Canyon live oak (Q. chrysolepis)
85 Interior live oak (Q. wislizenii)
86 Oregon white oak (Q. garryana)
87 Tanoak (Lithocarpus densiflora)
88 Other oaks
89

90 Hard textured hardwoods (90-98)

91 California laurel (Umbellularia californica)
92 Cascara buckthorn (Rhamnus purshiana)
93 Golden chinquapin (Castanopsis chrysophylla)
94 Madrone - all Arbutus spp.
95 Dogwood - all Cornus spp.
96 Sycamore - all Platinus spp.
97
98

99 None or unknown

7. DATA FORMS AND TABLES

One requirement for the efficient use of the IBM method of compilation is that the data to be transferred to the IBM cards must be recorded in code on Data Forms prepared for this purpose. These forms must be designed so that the data will flow in an orderly manner from the form to the IBM card. This allows the operator to make full use of the automatic duplicating features of the key punch, and improves the production and accuracy of the key punching operation.

The data forms designed for use in recording the Mill Scale data prior to its transfer to the IBM cards are described and illustrated in the Plan and Supplement section 7 - Layout of Forms, as follows:

7a. Log Scale (Form #26). This form was adapted for use with the IBM method of compilation from a form being used by the Division of Timber Management, Region 5. The placement of the item headings and columns in this form controlled the design of the IBM cards.

7b. Board Tally revised in the Supplement, to the Lumber Grade and Tally form.

7c. Initial to Final Grades Tally form

7d. Initial to Final Grades Record

7e. Green Lumber Grades and Tally form was added in the Supplement to the Plan.

Two more forms were added for use in compiling the Mill Scale data, as follows:

(1) Table of Lumber Grade Selling Prices. This table was used to record the selling price of each lumber grade for each species in the study. One table was prepared for each species. All information was recorded in the table in code. The Lumber Grade Selling Price Master Deck No. 87 was key punched from the Table of Lumber Grade Selling Prices.

(2) Table of Lumber Recovery Percents. This table was used to record the lumber grade recovery percents read from curves for each rough dry lumber grade of each DIB group, log grade, and species. One table was prepared for each log grade of each species. All information was recorded in code in the table.

The Lumber Grade Recovery Percent by Log Grade and DIB Group Deck No. 19 was key punched from the Table of Lumber Recovery Percents. The Table of Lumber Grade Selling Prices and the Table of Lumber Recovery Percents are illustrated below:

TABLE OF LUMBER GRADE SELLING PRICES

Mill Scale Study No. (xx) Species (xx)

Kind tally (x)

Lumber grade	Selling price
(xx)	(xxx.xx)

TABLE OF LUMBER RECOVERY PERCENTS

Mill Scale Study No. (xx) Species (xx)

Log Grade (x) Initial kind tally (x)

DIB group	Lumber grade	Lumber recovery percent
(xx)	(xx)	(x.xxx)

RE-CAL
FOREST SURVEY
IBM System
Contracts, No. 1573-02

PART III

PLAN FOR COMPILATION OF MILL SCALE STUDY DATA

by

THE IBM METHOD

November 1954

Prepared by

Robert M. Miller
Division of Forest Economics
California Forest and Range Experiment Station

R5TM-Mill Scale
No. 1573-02 11/54

PLAN FOR COMPILATION OF MILL SCALE STUDY DATA by THE IBM METHOD

1. Introduction (See 12/17/54 Supplement)

The Division of Timber Management conducts mill scale studies to determine the yields of lumber by standard grades cut from various sized logs of standard grades, and to determine the amount of loss and change in grade of the lumber due to drying and surfacing.

Mill scale studies are usually composed of two phases: the log phase and the lumber phase.

In the log phase the study logs are identified, graded, and scaled. The green lumber sawn from each log is identified.

For the lumber phase two methods of study may be utilized to obtain the desired statistics. One method is to identify, tally, and grade each board as it is surfaced. The preferred method, used in this plan, is to follow a sample of each green grade (providing the lumber is green graded), or a sample of each rough dry grade (if the lumber is not green graded), through the subsequent processes of drying and surfacing.

If the lumber is green graded, a sample of each grade is tallied into the drying facility and tallied out by rough dry grade. Each rough dry grade is tallied into the planer and tallied out by surfaced grade. If the lumber is not green graded, it is dried and a sample of each rough dry grade is tallied into the planer and tallied out by surfaced grade.

The results of the sample are summarized and applied to all of the study lumber at whatever point it was completely tallied and graded. The study lumber results are summarized to obtain the statistics of yield by lumber grade for the various log sizes and grades.

Two mill scale studies are planned in the near future. The first study is to be done in cooperation with the Ivory Pine Company of Dinuba. This study is described in the S-SALES, Appraisals, Mill Scale Studies, "Proposed Dinuba Mill Scale Study, Sequoia National Forest," dated November 1, 1954. In this study the lumber will not be green graded.

The second study is to be done in cooperation with the Winton Lumber Company at Martel. In this study the lumber will be green graded. The Division of Timber Management will prepare a plan for this study.

The sections of this plan which follow, outline the procedures by which the mill scale study data will be compiled using the IBM method of punched card compilation. The compilation of the log phase data is described in section 2. Section 3 describes the methods that will be used for compilation of the lumber phase data, with section 3a describing the

method that will be used when the lumber is green graded; and section 3b describing the method for use when the lumber is rough dry graded only. A short description of the summary tabulations is given in section 4. The punch cards required for the compilation are described in section 5. The codes proposed for use with mill scale studies are listed in section 6. Section 7 includes the forms proposed for field data recording and some suggestions for their use. Detailed IBM machine procedures must be prepared before compilation begins.

2. Compilation of Log Phase Data (See 12/17/54 Supplement)

The log phase data will be collected and compiled in the same way for either method of collecting and compiling the lumber phase data. The log data is recorded in code on the Log Scale Form No. 26 (see section 7a). Data for ten logs can be recorded on a single sheet. The log control data is present on the form in the following order, from left to right: log number, log grade, species, log length, diameter large end of log, and diameter, small end of log. The quantitative data for each log is recorded at the right side of the sheet with the gross scale above the net scale. The mill scale study number is present at the top of each sheet.

The mill scale study number, the log control data, and the quantitative data will be punched in the Log Card No. 11 (see section 6a). One card will be punched for each log. The mill scale study number will be gang punched. The species code can be gang punched if only one species is present in the study data. The balance of the items will be key punched and verified.

The log cards will be sorted on small end diameter and the 4-inch diameter class code gang punched. The net percent of gross scale (cull factor) will be calculated and punched for each log card.

A part of the lumber phase compilations is to summarize the green lumber recovery (if obtained), the rough dry lumber recovery, and the surfaced lumber recovery for each log. This information will be gang punched into each log card and the statistics listed below will be calculated and punched for each log.

Green Lumber Recovery
- Percent of net log scale

Rough Dry Lumber Recovery
- Percent of Net Log Scale (overrun factor)
- Percent of green lumber recovery

Surfaced Lumber Recovery
- Percent of net log scale
- Percent of green lumber recovery
- Percent of rough dry lumber recovery (planer loss factor)

The log cards will be used to prepare summary tabulations of log scale and lumber recovery by log diameter group and log grade. These cards also will be used to prepare summary tabulations of cull, overrun, and planer loss factors by log diameter group.

3. Compilation of Lumber Phase Data (See 12/17/54 Supplement)

Each board sawn from each log will be identified with the log number. Then each board must be tallied and graded. This will be done before the boards are dried, i.e., green graded; or after the boards are dried and before they are surfaced, i.e., rough dry graded.

The individual board grade and tally will be recorded in the same manner for either green grading or rough dry grading. This will be done on a Board Tally form similar to the example included in section 7b. The following control and quantitative information will be present for each board: log number of the log from which the board was sawn, lumber grade, and lumber tally. The thickness, width, and length of the board also may be present, but these items will not be coded.

The board control and quantitative information will be coded after the board tally and grading is completed. In addition, the mill scale study number and the kind of grade and tally (green or rough dry) will be coded at the top of each Board Tally form.

The mill scale study number, kind of grade and tally, and the board control and quantitative information will be punched in the Board Card No. 12 (see section 6b). One card will be punched for each board. These cards will be key punched and verified.

The Log Cards No. 11 and the Board Cards No. 12 will be merged and the log control information (log grade, species, and 4-inch diameter group) will be gang punched into the Board Cards.

The Board Cards No. 12 will be used to prepare summary tabulations of lumber recovery by lumber grade for each log. These tabulations will be used in the compilation procedures for either green grading or rough dry grading as outlined in the sub-sections that follow.

3a. Complete Green Grading (See 12/17/54 Supplement)

When each board is green graded and tallied (this is the information punched in the Board Card No. 12, Kind of Tally Code No. 1), a sample of each green grade will be tallied into the drying facility. The sample boards for each green grade will be tallied and graded out of the drying facility. The rough dry grades and tally will be recorded for each green grade on the Initial Grade to Final Grades Tally form (see section 7c).

The data on the above form will be summarized to obtain the total footage of each rough dry grade (including drying losses) for each green grade and expressed in percentages to the nearest 0.1 percent. The control information (mill scale study number, species, kind of tally, green grade, and rough dry grades), the rough dry percentages, and the number of rough dry grades for each green grade will be coded on the Initial Grade to Final Grades Record. This Record is illustrated in section 7d.

The green grade to rough dry lumber grades, percentages, and controlling information will be punched in the Initial Lumber Grade to Final

Lumber Grades Master Cards No. 89; Kind of Tally Code 1, (see section 5c). One card will be punched for each green grade. These cards will be key punched and verified.

A summary tabulation of green lumber recovery by green grade will be prepared for each log using the Board Cards No. 12. At the same time, the Initial Lumber Grade and Tally Summary Card No. 13, Initial Kind of Tally Code 1, will be summary punched (see section 5d).

The master Cards No. 89 and the Grade Summary Cards No. 13 will be merged and the rough dry lumber tally (Final Kind of Tally Code 2) will be calculated and punched for each green grade of each log. This calculation will be proved using the tabulator.

The Final Lumber Grade and Tally by Initial Grade Cards No. 14, Initial Kind of Tally Code 1, Final Kind of Tally Code 2 (see section 5e), will be reproduced from the Grade Summary Cards No. 13. One card No. 14 will be reproduced for each rough dry grade of each green grade for each log, in Card No. 13. The information listed below will be punched in each Final Lumber Grade and Tally by Initial Grade Card No. 14:

- Mill Scale Study Number
- Log Number
- Log Grade
- Species
- 4-inch Diameter Group
- Kind of Tally, Initial (Green)
- Lumber Grade, Initial (Green)
- Kind of Tally, Final (Rough Dry)
- Lumber Grade, Final (Rough Dry)
- Lumber Tally, Final (Rough Dry)
- Number of Rough Dry Grades for the Green Grade

The Final Grade Cards No. 14, Final Kind of Tally Code 2, will be used to prepare a summary tabulation of rough dry lumber recovery by rough dry lumber grade for each log. At this time a new deck of Initial Lumber Grade and Tally Summary Cards No. 13, Initial Kind of Tally Code 2, will be summary punched. These cards No. 13 will contain rough dry grades and tally as the initial data. The original deck of Card No. 13 contained green grades and tally as the initial data. The two decks of Card No. 13 will be distinguished by the Kind of Tally Code present in each card.

The sample of green lumber that was used previously was tallied out of the drying facility by rough dry grade. This same lumber will be followed through the planer. If additional lumber is needed for an adequate sample in any rough dry grade, it will be taken from the rough dry study lumber not included in the previous green lumber sample. The sample boards for each rough dry grade will be tallied into the planer. These boards will be tallied and graded out of the planer. The surfaced grades and tally will be recorded for each rough dry grade on the Initial Grade to Final Grades Tally form (section 7c).

The data on the above form will be summarized to obtain the total footage of each surfaced grade (including surfacing losses) for each rough dry grade and expressed in percentages to the nearest 0.1 percent. The control information (mill scale study number, species, kind of tally, rough dry grade, and surfaced grades), the surfaced percentages, and the number of surfaced grades for each rough dry grade will be coded on the Initial Grade to Final Grades Record. This record is illustrated in section 7d.

The rough dry grade to surfaced lumber grades, percentages and controlling information will be punched in a new deck of Initial Lumber Grade to Final Lumber Grades Master Cards No. 89, Kind of Tally Code 2. One card will be punched for each rough dry grade. The cards will be key punched and verified.

The new Master Cards No. 89 and the new Grade Summary Cards No. 13, Initial Kind of Tally Code 2, will be merged and the surfaced lumber tally (Final Kind of Tally Code 3) will be calculated and punched for each rough dry grade of each log. This calculation will be proved using the tabulator.

A new deck of Final Lumber Grade and Tally Cards No. 14, Initial Kind of Tally Code 2, Final Kind of Tally Code 3, will be reproduced from the new Grade Summary Cards No. 13, Initial Kind of Tally Code 2. One card No. 14 will be reproduced for each surfaced grade of each rough dry grade for each log in Card No. 13. The information listed below will be punched in each new Final Lumber Grade and Tally Card No. 14:

Mill Scale Study Number	Kind of Tally, Initial (Rough Dry)
Log Number	Lumber Grade, Initial (Rough Dry)
Log Grade	Kind of Tally, Final (Surfaced)
Species	Lumber Grade, Final (Surfaced)
4-inch Diameter Group	Lumber Tally, Final (Surfaced)
	Number of surfaced grades for the rough dry grade

The new deck of Final Grade Cards No. 14, Final Kind of Tally Code 3, will be used to prepare a summary tabulation of surfaced lumber recovery by surfaced lumber grade for each log. At this time the Final Lumber Grade and Tally Summary Cards No. 15, Final Kind of Tally Code 3, will be summary punched (see section 5f). These summary cards No. 15 will contain the total surfaced lumber tally for each surfaced grade of each log.

The summary deck of Card No. 15 will be used to prepare the summary tabulations of surfaced lumber recovery by surfaced grade for each log grade and diameter group.

The original deck of Card No. 13, Initial Kind of Tally Code 1, containing green lumber recovery by green grade for each log, the new deck of Card No. 13, Initial Kind of Tally Code 2, containing rough dry lumber recovery by rough dry grade for each log, and the summary deck of Card No. 15 containing surfaced lumber recovery by surfaced lumber grade for each log will be sorted and merged. A summary tabulation will be prepared, using the merged cards, of total green lumber recovery (not including loss), total rough dry lumber recovery (not including loss), and total surfaced lumber recovery (not including loss), for each log. At this time these totals will be summary punched into a summary work card.

The summary work cards will be merged with the Log Cards No. 11 and the lumber recoveries will be gang punched into Card No. 11. Lumber recovery statistics will be calculated for each Card No. 11 as described in the last paragraph of section 2.

3b. Complete Rough Dry Grading (See 12/17/54 Supplement)

When each board is rough dry graded and tallied (this is the information punched in the Board Card No. 12, Kind of Tally Code 2), a sample of each rough dry grade will be tallied into the planer. The sample boards for each rough dry grade will be tallied and graded out of the planer. The surfaced grades and tally will be recorded for each rough dry grade on the Initial Grade to Final Grades Tally form (section 7c).

The data on the above form will be summarized to obtain the total footage of each surfaced grade (including surfacing losses) for each rough dry grade and expressed in percentages to the nearest 0.1 percent. The control information (mill scale study number, species, kind of tally, rough dry grade, and surfaced grades), the surfaced percentages, and the number of surfaced grades for each rough dry grade will be coded on the Initial Grade to Final Grades Record (see section 7d).

The rough dry grade to surfaced lumber grades, percentages and controlling information will be punched in the Initial Lumber Grade to Final Lumber Grades Master Cards No. 89, Kind of Tally Code 2 (see section 5c). One card will be punched for each rough dry grade. The cards will be key punched and verified.

A summary tabulation of rough dry lumber recovery by rough dry grade will be prepared for each log using the Board Cards No. 12. At the same time the Initial Lumber Grade and Tally Summary Card No. 13, Initial Kind of Tally Code 2, will be summary punched. (see section 5d).

The Master Cards No. 89 and the Grade Summary Cards No. 13 will be merged and the surfaced lumber tally will be calculated and punched for each rough dry grade of each log. This calculation will be proved using the tabulator.

The Final Lumber Grade and Tally by Initial Grade Cards No. 14, Initial Kind of Tally Code 2, Final Kind of Tally Code 3, (see section 5e) will be reproduced from the Grade Summary Cards No. 13. One card No. 14 will be reproduced for each surfaced grade of each rough dry grade for each log in Card No. 13. The information listed below will be punched in each Final Lumber Grade and Tally Card No. 14:

Mill Scale Study Number	4-inch Diameter Group
Log Number	Kind of Tally, Initial (Rough Dry)
Log Grade	Lumber Grade, Initial (Rough Dry)
Species	Kind of Tally, Final (Surfaced)
Number of Surfaced Grades for the Rough Dry Grade	Lumber Grade, Final (Surfaced)
	Lumber Tally, Final (Surfaced)

The Final Lumber Grade Cards No. 14, Final Kind of Tally Code 3, will be used to prepare a summary tabulation of surfaced lumber recovery by surfaced lumber grade for each log. At this time the Final Lumber Grade and Tally Summary Cards No. 15, Kind of Tally Code 3, will be summary punched. These summary cards No. 15 will contain the total surfaced lumber tally for each surfaced grade of each log.

The summary deck of Card No. 15 will be used to prepare the summary tabulations of surfaced lumber recovery by surfaced grade for each log grade and diameter group.

The deck of Card No. 13, Initial Kind of Tally Code 2, containing rough dry lumber recovery by rough dry grade for each log and the summary deck of Card No. 15 containing surfaced lumber recovery by surfaced lumber grade for each log will be sorted and merged. A summary tabulation will be prepared, using the merged cards, of total rough dry lumber recovery (not including loss) and total surfaced lumber recovery (not including loss), for each log. At this time these totals will be summary punched into a summary work card.

The summary work cards will be merged with the Log Cards No. 11, the lumber recoveries will be gang punched and the lumber recovery statistics will be calculated for each Card No. 11, as described in the last paragraph of section 2.

4. Summary Tabulations (See 11/17/54 Revision)

The requests for summary tabulations should be accompanied by specific instructions giving the deck of cards to use, the control items[1/] to be included, the quantitative items[2/] to accumulate, and a table outline with complete headings and explanatory notes. It then will be possible to determine the exact cards and items to use for the desired summary.

The decks of cards with the control items and the quantitative items present in each deck are listed below:

1/ Control items are those items that identify the original source (mill scale study number, kind of tally and log number); and those items used to crsss index and classify the data to produce the desired summaries (like log grade, 4-inch diameter group, lumber grade, etc.).

2/ Quantitative items are those items to be added, subtracted, multiplied, or divided (like gross and net scale and lumber tally).

Card No. 11 - Log Card

Control Items

Mill Scale Study Number
Log Number
Log Grade
Species
Log length
Diameter large end
Diameter small end
4-inch diameter group

Quantitative Items

Log Length
Diameter large end
Diameter small end
Gross log scale
Net log scale
Net percent of gross scale
*Green lumber recovery
*G.L.R. Percent of net log scale
Rough dry lumber recovery
R.D.L.R. Percent of net log scale
*R.D.L.R. Percent of G.L.R.
Surfaced lumber recovery
S.L.R. Percent of net log scale
*S.L.R. Percent of G.L.R.
S.L.R. Percent of R.D.L.R.

*Providing Green Lumber is graded and tallied.

Card No. 12 - Board Card

Control Items

Mill Scale Study Number
Log Number
Log Grade
Species
4-inch Diameter Group
Kind of Tally
Lumber Grade (green or rough dry)

Quantitative Items

Lumber Tally (green or rough dry)

Card No. 13 - Initial Lumber Grade and Tally Summary Card

Control Items

Mill Scale Study Number
Log Number
Log Grade
Species
4-inch Diameter Group
*Kind Tally
*Initial Lumber Grade

Quantitative Items

* Lumber Tally

*If lumber is green tallied the original deck has green grades and tally as initial data and the "new" or second deck has rough dry grades and tally as initial data. If lumber is rough dry tallied the original deck has rough dry grades and tally as initial data and there is no second deck.

Card No. 14 - Final Lumber Grade and Tally by Initial Grade Card

Control Items

Mill Scale Study Number
Log Number
Log Grade
Species
4-inch Diameter Group
*Kind of Tally, Initial
*Lumber Grade, Initial
*Kind of Tally, Final
*Lumber Grade, Final

Quantitative Items

* Lumber Tally, Final

*If the lumber is green tallied the original deck has green grades as initial data and rough dry grades and tally as final data; the "new" or second deck has rough dry grades as initial data and surfaced grades and surfaced tally as final data, but not in summary form. If the lumber is rough dry tallied the original deck has rough dry grades as initial data and surfaced grades and surfaced tally as final data, but not in summary form.

Card No. 15 - Final Lumber Grade and Tally Summary Card

Control Items

Mill Scale Study Number
Log Number
Log Grade
Species
4-inch Diameter Group
Kind of Tally, Final
Lumber Grade, Final

Quantitative Items

Lumber Tally, Final

These cards have the surfaced grades and surfaced tally as final data in summary form.

As an example of a request for a summary tabulation, assume that a tabulation is wanted of the surfaced lumber recovery by surfaced lumber grade for each 4-inch diameter group within each log grade by species: Accumulate the surfaced lumber tally by surfaced grade by 4-inch d.i.b. group, log grade and species. Use the deck of summary Cards No. 15, kind of tally code 3. The table for which this is desired looks like:

"Distribution of White Fir Shipping Grades Produced by Log Grade and Diameter Group -- Board Feet"

DIB Group	Shipping Grades: C and better	D Select	3 Clear	1 Shop	2 Shop	3 Shop	etc.	All grades
			Log Grade I					
22-25								
26-29	Lumber Tally							
30-33								
etc.								
			Log Grade II					
etc.								
			Log Grade III					
etc.								

The tabulation that will be prepared in response to this request will look like:

"Surfaced Lumber Recovery by Grade within Log Grades by Diameter Groups"

Card 15, Kind of Tally 3

Mill Scale Study No:	Species	Log Grade:	4" DIB	Surfaced lumber grade	Surfaced Lumber Tally--B.F.-by: Lumber grade	DIB group	Log grade	Species
01	06	1	06	01	xxx*			
				02	xxx*			
				03	xxx*			
				etc.	xxx*	xxxx*		
			07	01	xxx*			
			etc	etc	xxx*	xxxx*	xxxxx*	
		2	03	01	xxx*			
			etc	etc	xxx*	xxxx*	xxxxx*	
		3	etc	etc	xxx*	xxxx*	xxxxx*	
								xxxxxx*

It is possible to prepare summary tabulations by any combinations of controlling items, provided those items are punched in the cards that must be used. By sorting the cards in the proper sequence of controlling items it is possible automatically to obtain totals at three levels of control within a tabulation and an overall total for the entire tabulation, provided that the combined number of digits in the totals do not exceed the available counter space.

The summary tabulations probably will follow much the same form for each mill scale study. Therefore, the tabulations can be outlined before any summary runs are begun and the procedures will have to be prepared only once.

Some examples of the summary tabulations that may be made and the cards that would be used are:

a. Number of logs and sum of cull factors, overrun factors, and planer loss factors by species and diameter group. Card No. 11.

b. Number of logs and sum of surfaced lumber recovery by lumber grade, log grade, and diameter group. Summary Card No. 15, Kind of Tally code 3.

c. Number of logs and sum of rough dry lumber recovery by lumber grade, log grade, and diameter group. Card No. 13, Initial Kind of Tally code 2.

d. Number of logs and sum of green lumber recovery by lumber grade, log grade, and diameter group. Card No. 13, Initial Kind of Tally code 1.

e. Number of logs and sum of surfaced lumber recovery by surfaced grade and rough dry grade. Card No. 14, Initial Kind of Tally code 2, Final Kind of Tally code 3.

f. Number of logs and sum of rough dry lumber recovery by rough dry grade and green grade. Card No. 14, Initial Kind of Tally code 1, Final Kind of Tally code 2.

Many more tabulations of a similar nature can be prepared from the data in the log, board, and lumber grade cards.

It is possible to summary punch the footages by any desired control items and then to calculate the percentages of the total represented by these footages. The cards with the percentages in them could then be used for summary tabulations.

5. Punch Cards Required (See 12/17/54 Supplement)

The descriptions of the punch cards required for the compilation of mill scale study data are given in this section. Although cards have been designed for this job, we will utilize the regular stock cards now on hand rather than having special cards printed. The data will be punched in the columns of the stock cards as described in the sub sections that follow.

Columns 1 and 2 of all cards are reserved for the card number. After these columns the controlling information is punched in the same order as it appears on the original documents, generally in descending order of application. The quantitative information is punched following the control information. Special controlling and identifying X position and 12 position punches are placed in selected columns of certain cards as noted.

The controlling information, quantitative information, card column numbers and punching information are given in the following sub sections for each kind of punch card required for this job.

5a. Card No. 11 - Log Card (See 12/17/54 revision)

Punched as indicated in the right hand column below. Log cards will have a right corner cut.

Card Column	Field	Punching[1]
	Controls	
1-2	Card Number	D
3-4	Mill Scale Study Number	D
5-8	Log Number	K.P.
9	Log Grade	K.P.
10-11	Species	K.P. or D
12-13	Length of log, feet (0 dec.)	K.P.
14-15	Diameter, large end, i.b., inches (0 dec.)	K.P.
16-17	Diameter, small end, i.b., inches (0 dec.)	K.P.
18-19	4-inch Diameter Group (small end)	G.P.
	Quantitative	
20-22	Gross Scale, Dec. C	K.P.
23-25	Net Scale, Dec. C	K.P.
26-29	Net percent of gross scale (3 dec.)	Calc.
30-33	Green Lumber Recovery, FBM	G.P.
34-37	Green Lumber Percent of Net Log Scale (3 dec.)	Calc.
38-41	Rough Dry Lumber Recovery, FBM	G.P.
42-45	Rough Dry Percent of Net Log Scale (3 dec.)	Calc.
46-49	Rough Dry Percent of Green Lumber Recovery (3 dec.)	Calc.
50-53	Surfaced Lumber Recovery, FBM	G.P.
54-57	Surfaced Percent of Net Log Scale (3 dec.)	Calc.
58-61	Surfaced Percent of Green Lumber Recovery (3 dec.)	Calc.
62-65	Surfaced Percent of Rough Dry Lumber Recovery(3dec.)	Calc.
66-80	Blank columns	-
	X Punches	
60	Control X Punch	G.P.
	12 Punches	

1/ G.P. = Gang Punch; K.P. = Key Punch; Calc = Calculated and punched; S.P. Summary Punch; D = Duplicated.

5b. Card No. 12 - Board Card (See 12/17/54 revision).

Punched as indicated in the right hand column below. Log control items gang punched from Log Card No. 11. These cards will have a left corner cut.

Card Column	Field	Punching
	Controls - Log	
1-2	Card Number	D
3-4	Mill Scale Study Number	D
5-8	Log Number	K.P.
9	Log Grade	G.P.
10-11	Species	G.P.
12-17	Blank columns	-
18-19	4-inch Diameter Group	G.P.
	Controls - Lumber	
20	Kind of Grade and Tally	D
21-22	Lumber Grade	K.P.
	Quantitative	
23-25	Lumber Tally, FBM	K.P.
26-80	Blank columns	-
	X Punches	
34	Control X Punch	G.P.
	12 Punches	

5c. Card 89 - Initial Lumber Grade to Final Lumber Grades Master Cards (See 5/27/55 revision).

Punched as indicated in the right hand column below. These cards will have a right corner cut.

Card Column	Field	Punching
	Controls	
1-2	Card Number	D
3-4	Mill Scale Study Number	D
5-9	Blank columns	-
10-11	Species	K.P. or D
12-19	Blank columns	-
20	Kind of Grade and Tally, Initial	D
21-22	Lumber Grade, Initial	K.P.
	Quantitative	
	Final Lumber Grades and Percentages of Initial Grade and Tally	
23-24	Grade, first	K.P.
25-27	Percent in first (3 dec.)	K.P.
28-29	Grade, second	K.P.
30-32	Percent in second (3 dec.)	K.P.
33-34	Grade, third	K.P.
35-37	Percent in third (3 dec.)	K.P.
38-39	Grade, fourth	K.P.
40-42	Percent in fourth (3 dec.)	K.P.
43-44	Grade, fifth	K.P.
45-47	Percent in fifth (3 dec.)	K.P.
48-49	Grade, sixth	K.P.
50-52	Percent in sixth (3 dec.)	K.P.
53-54	Grade, seventh	K.P.
55-57	Percent in seventh (3 dec.)	K.P.
58-59	Grade, eighth	K.P.
60-62	Percent in eighth (3 dec.)	K.P.
63-64	Grade, ninth	K.P.
65-67	Percent in ninth (3 dec.)	K.P.
68-69	Grade, tenth	K.P.
70-72	Percent in tenth (3 dec.)	K.P.
73-79	Blank columns	-
80	Number of final grades for initial grade	K.P.
	X Punches	
12	Control X Punch	G.P.
23,28,33,38,43,48,53,58,63,68	Possible X skips	-
	12 Punches	

5d. Card 13 - Initial Lumber Grade and Tally Summary Card (See 12/17/54 revision)

Punch as indicated in the right hand column below. Summary punched from Board Card No. 12 or Lumber Grade and Tally Card No. 14. Final lumber grades and tally calculated using Master Card No. 89. These cards will have a left corner cut.

Card Column	Field	Punching
	Controls - Log	
1-2	Card Number	G.P.
3-4	Mill Scale Study Number	S.P.
5-8	Log Number	S.P.
9	Log Grade	S.P.
10-11	Species	S.P.
12-17	Blank columns	-
18-19	4-inch Diameter Group	S.P.
	Controls - Lumber, initial	
20	Kind of Grade and Tally, Initial	S.P.
21-22	Lumber Grade, Initial	S.P.
	Quantitative - Lumber, initial	
23-25	Lumber Tally FBM, Initial	S.P.
	Controls - Lumber, final	
26	Kind of Grade and Tally, Final	G.P.
	Final Lumber Grades from Initial Lumber Grade:	
27-28	Grade, first	Calc.
29-30	Grade, second	Calc.
31-32	Grade, third	Calc.
33-34	Grade, fourth	Calc.
35-36	Grade, fifth	Calc.
37-38	Grade, sixth	Calc.
39-40	Grade, seventh	Calc.
41-42	Grade, eighth	Calc.
43-44	Grade, ninth	Calc.
45-46	Grade, tenth	Calc.

Card 13 (cont.)

Card Column	Field	Punching
	Quantitative - Lumber, final	
	Final Lumber Tally by Final Lumber Grade from Initial Lumber Grade and Tally FBM:	
47-49	Tally for first grade	Calc.
50-52	Tally for second grade	Calc.
53-55	Tally for third grade	Calc.
56-58	Tally for fourth grade	Calc.
59-61	Tally for fifth grade	Calc.
62-64	Tally for sixth grade	Calc.
65-67	Tally for seventh grade	Calc.
68-70	Tally for eighth grade	Calc.
71-73	Tally for ninth grade	Calc.
74-76	Tally for tenth grade	Calc.
77-79	Total final tally of all final grades of initial grade, FBM	Calc.
80	Number of final grades for initial grade	G.P. or Calc.
	X Punches	
80	Control X Punch	G.P.
	12 Punches	

5e. Card 14 - Final Lumber Grade and Tally by Initial Grade Card (See 12/17/54 revision).

Punched as indicated in the right hand column below. Reproduced from Initial Lumber Grade and Tally Card No. 13. These cards will have a left corner cut.

Card Column	Field	Punching
	Controls - Log	
1-2	Card Number	G.P.
3-4	Mill Scale Study Number	G.P.
5-8	Log Number	G.P.
9	Log Grade	G.P.
10-11	Species	G.P.
12-17	Blank columns	-
18-19	4-inch Diameter Group	G.P.
	Controls - Lumber, initial	
20	Kind of Grade and Tally, Initial	G.P.
21-22	Lumber Grade, Initial	G.P.
23-25	Blank columns	-
	Controls - Lumber, final	
26	Kind of Grade and Tally, final	G.P.
27-28	Lumber Grade, final	G.P.
	Quantitative - Lumber, final	
29-31	Lumber Tally, final	G.P.
32-79	Blank columns	-
80	Number of final grades for initial grade	G.P.
	X Punches	
30	Control X Punch	G.P.
	12 Punches	

5f. Card 15 - Final Lumber Grade and Tally Summary Card (See 12/17/54 revision).

Punched as indicated in the right hand column below. Summary punched from Final Lumber Grade and Tally Card No. 14. These cards will have a left corner cut.

Card Column	Field	Punching
	Controls - Log	
1-2	Card Number	G.P.
3-4	Mill Scale Study Number	S.P.
5-8	Log Number	S.P.
9	Log Grade	S.P.
10-11	Species	S.P.
12-17	Blank columns	-
18-19	4-inch Diameter Group	S.P.
	Controls - Lumber, final	
20	Kind of Grade and Tally, final	G.P.
21-22	Lumber Grade, final	S.P.
	Quantitative - Lumber, final	
23-25	Lumber Tally, final	S.P.
26-80	Blank columns	-
	X Punches	
34	Control X Punch	G.P.
	12 Punches	

6. Coding and Codes (See 12/17/54 Supplement and Revision)

a. Coding

Each item that is punched in the cards must be expressed in a numerical code. The codes for each item are entered in the space provided for them on the original documents. (See section 7). Complete codes must be entered in all instances, using the total number of digits allowed for that particular code. Where the entry consists of numbers now present on the documents (such as log length, diameter, scale, and other similar entries) zeros must be added to the left of the first significant digit, if necessary, to use the total number of digits allowed for that item. If an entry is composed entirely of zeros, only one zero need be entered.

Codes should be entered on the original documents, above or to one side of the item being coded, in a legible manner using colored pencil or ink. No erasures should be made. Instead, cross out the incorrect entry and place the correct entry above or to one side of the incorrect entry.

The codes are presented in three parts: first, all of the codes that are entered on the Log Scale form No. 26; second, all of the codes that are entered on the Board Tally form; and third, all of the codes that are entered on the Initial Grade to Final Grades Record. Within each of these parts the main item codes are given in the order that they are recorded on the original documents. Within each main item the individual items to be coded are listed in numerical order of the code.

b. Codes

The mill scale study codes by main item are:

(1) Card Number. Not recorded on any document. Duplicated as a two-digit code as the cards are key punched; or gang punched as the cards are reproduced. The card numbers are:

11 - Log Card
12 - Board Card
13 - Initial Lumber Grade and Tally Summary Card
14 - Final Lumber Grade and Tally by Initial Grade Card
15 - Final Lumber Grade and Tally Summary Card

89 - Initial Lumber Grade to Final Lumber Grades Master Card.

Log Scale Form No. 26 Codes (See 12/17/54 Revision)

(2) Mill Scale Study Number. Recorded as a two-digit code at the top left side of the form. For numbers 1 to 9, record one zero to the left. This item usually will be gang punched or duplicated. The mill scale study numbers are:

01 - Dinuba Study (Ivory Pine Co.) 1954-55
02 - Martel Study (Winton Lumber Co.) 1955
03 -
04 -
05 -

(3) Log Number. Recorded as a four-digit code in the Log No. (or Mill No.) column for each log. If it is known that a mill scale study will not consist of more than 999 logs of all species, the log number may be recorded as a three-digit code. For numbers 1 to 9, record three (or two) zeros to the left; for numbers 10 to 99, record two (or one) zeros to the left; and for numbers 100 to 999 record one (or no) zeros to the left. Some examples of complete log number codes are:

Symbol	Code when 1000 or more logs	Code when 999 or less logs
3	0003	003
87	0087	087
241	0241	241
1075	1075	-

(4) Log Grade. Recorded as a single-digit code in the Log Grade column (right half of the Log No. or Mill No. column) for each log. The log grade codes correspond to the log grade symbols of the log grades being used for a particular mill scale study. The log grade codes are:

1 Log Grade 1
2 Log Grade 2
3 Log Grade 3
4 Log Grade 4
5 Log Grade 5
6 Log Grade 6
9 Cull Log

(5) Species. Recorded as a two-digit code in the Spec. column for each log. If only one species is being studied, the species code can be entered once on each form for the first log on the form. The commercial conifer species codes are:

Symbol	Code	Species	Symbol	Code	Species
PP	01	Ponderosa Pine	GS	11	Grand Fir
SP	02	Sugar Pine	LP	13	Lodgepole Pine
R	03	Redwood	POC	14	Port Orford white-cedar
DF	04	Douglas-fir	SS	15	Sitka Spruce
RF	05	Red Fir	WH	16	Western Hemlock
WF	06	White Fir	WRC	17	Western red cedar
IC	07	Incense Cedar	WP	18	White Pine
JP	08	Jeffrey Pine	ES	19	Englemann Spruce
BT	10	Bigtree	MH	20	Mountain Hemlock

(6) Log Length. Recorded as a two-digit code in the Length column for each log. For lengths up to 9, record one zero to the left.

(7) Log Diameter, large end. Recorded as a two-digit code in the Large End Diam. column for each log. For diameters up to 9, record one zero to the left. If the large end is the butt end of the log, record the code 00.

(8) Log Diameter, small end. Recorded as a two-digit code in the Small End Diam. column for each log. For diameters up to 9, record one zero to the left.

(9) Diameter Group, 4-inch (small end). Not recorded on the Log Scale form. Gang punched as a two-digit code. The 4-inch diameter group codes are:

Code	Range in Diameter Small End	Code	Range in Diameter Small End
01	02-05	14	54-57
02	06-09	15	58-61
03	10-13	16	62-65
04	14-17	17	66-69
05	18-21	18	70-73
06	22-25	19	74-77
07	26-29	20	78-81
08	30-33	21	82-85
09	34-37	22	86-89
10	38-41	23	90-93
11	42-45	24	94-97
12	46-49	25	98-101
13	50-53	etc	etc

(10) Scale, Cross. Recorded as a three-digit code in the Scale and Defects column, Gross Sc. line for each log. For scales of 1 to 9, record two zeros to the left; and for scales of 10 to 99, record one zero to the left. The gross scale is in Scribner Dec. C.

(11) Scale, Net. Recorded as a three-digit code in the Scale and Defects column, Net Scale line for each log. For scales of 1 to 9, record two zeros to the left; and for scales of 10 to 99, record one zero to the left. The net scale is in Scribner Dec. C.

Board Tally Codes

(12) Mill Scale Study Number. Recorded as a two-digit code in the space provided at the top of the form. This item usually will be gang punched or duplicated. The mill scale study numbers are listed in paragraph (2) of this sub section.

(13) Kind of Tally. Recorded as a single-digit code in the space provided at the top of the form. The kind of tally recorded on the Board Tally form is that for which all of the boards for each log are 100 percent tallied and graded. The kind of tally codes are:

1 Green Grade and Tally
2 Rough Dry Grade and Tally
3 Surfaced Grade and Tally

(14) Log Number. Recorded as a four-digit code in the Log No. column for each board. If it is known that a mill scale study will not consist of more than 999 logs of all species, the log number may be recorded as a three-digit code. For numbers 1 to 9, record three (or two) zeros to the left; for numbers 10 to 99, record two (or one) zeros to the left; and for numbers 100 to 999, record one (or no) zeros to the left. (See also paragraph (3) of this sub section).

(15) Lumber Grade. Recorded as a two-digit code in the Lumber Grade (code) column for each board. The lumber grade codes are:

Code	Grade	Code	Grade
11	B and better	32	2 and Better Common
12	C Select	33	3 Common
13	C and better	34	4 Common
14	D Select	35	5 Common
15	Moulding	42	2 and Better Dimension
16	Factory Select (3 Clear)	43	3 Dimension
21	1 Shop	44	4 Dimension
22	2 Shop	80	Cull
23	3 Shop	98	Loss due to drying
		99	Loss due to surfacing

(16) Lumber Tally. Recorded as a three-digit code in the Lumber Tally column for each board. For tallies of 1 to 9, record two zeros to the left; and for tallies of 10 to 99, record one zero to the left.

Initial Grade to Final Grades Record Codes

(17) Mill Scale Study Number. Recorded as a two-digit code in the space provided at the top of the Record. This item usually will be gang punched or duplicated. The mill scale study numbers are listed in paragraph (2) of this sub section.

(18) Species. Recorded as a two-digit code in the space provided at the top of the Record. The species codes are listed in paragraph (5) of this sub section.

(19) Kind of Initial Tally. Recorded as a single-digit code in the space provided at the top of the record. The kind of tally code to record here is that for the initial lumber grade and tally. If the initial lumber sample was taken from green grades, record code 1; if the initial lumber sample was taken from rough dry grades, record code 2. The kind of tally codes are listed in paragraph (13) of this subsection.

(20) Lumber Grade, Initial. Recorded as a two-digit code in the space provided at the top of the record. The lumber grade code to recrod here is that for the grade from which the sample was drawn (i.e. all of the final grades were initially this one green grade or this one rough dry grade). The lumber grade codes are listed in paragraph (15) of this sub section.

(21) Lumber Grade, Final. Recorded as a two-digit code in the Grade column, with each final grade (rough dry or surfaced) recorded on a separate line. If six final grades are obtained from an initial grade, a final grade code is recorded opposite lines first--to sixth. The loss code for loss due to drying or surfacing is recorded as the last final grade (seventh line in the illustration). The lumber grade codes are listed in paragraph (15) of this sub section.

(22) Lumber Recovery Percent. Recorded as a three-digit code in the Percent Column with the percent recovery recorded opposite the proper lumber grade. For percents .1 to .9, record two zeros to the left; for percents 1.0 to 1.9, record one zero to the left. The lumber recovery percents are calculated on the basis of the initial lumber tally. The percent loss is calculated and recorded. The lumber recovery percents are calculated and recorded to the nearest 0.1 percent.

(23) Number of Final Grades for Initial Grade. Recorded as a single-digit code on the Total line of the Grade column. This is the total number of final grades obtained for each initial grade, including the loss, after drying or surfacing.

7. Layout of Forms (See 12/17/54 Supplement)

Control and quantitative data will be transferred to punch cards from three forms. To promote speed and accuracy of key punching, it is essential that the data be recorded on those forms in the same order as it will be punched in the cards. Therefore, the proposed layout of the three punching forms and an additional recording form, with some suggestions for their use, are given in the subsections that follow.

The items to be punched and the number of digits in each are indicated by X's on each form.

For ease of reading it is suggested that pencils of hardness not to exceed HB be used to record the data on these forms.

7a. Log Scale (Form #26). The Log Scale form is used in recording the data pertaining to each log of the mill scale study. The "Mill Scale Study No." must be added at the top of the form. The present "Mill No." column must be divided into the "Log No." column on the left, and the "Log Grade" column on the right.

It is suggested that all of the entries be made on this form in code, at the time each log is scaled. The scalers number is the number entered in the "Log No." column. The graders number also must be recorded for the purpose of obtaining the log grade. The graders number can be recorded in the margin or in the box beneath the other codes.

The Log Cards No. 11 will be key punched from the Log Scale form.

7b. Board Tally. The Board Tally form is used for tallying each board from each log. This 100 percent tally will be made of either green or rough dry lumber. This fact is to be noted and coded on the "Kind of Tally" line at the top of each form. Each board must be identified by log number; and the lumber grade and lumber tally must be recorded. Thickness, width, and length may be recorded if desired but this information will not be key punched.

The data probably will be entered on the Board Tally form by the lumber grader and, therefore, codes will not be used at this time. The codes will be entered later by the Division of Timber Management. It is suggested that the log number and the lumber tally be recorded at the right side of their respective columns. This will leave space at the left side to enter the zeros necessary for punching. The "Lumber Grade" column is split in two parts; one for recording the grade symbol, and the other for the grade code.

The Board Cards No. 12 will be key punched from the Board Tally form.

R5TM-Mill Scale
No. 1573-02 11/54 and 12/17/54

Mill Scale
Study No. (XX)

LOG SCALE (Form #26)

Log No.	Log Grade	Spec.	Lgth.	Large End Diam.	Small End Diam.	Scale and Defects	No. of Boards
(XXXX)	(X)	(XX)	(XX)	(XX)	(XX)	Gross Sc (XXX) ..... Net Scale (XXX) - (XX)	
						Gross Sc ..... Net Scale	
						Gross Sc ..... Net Scale	
						Gross Sc ..... Net Scale	
						Gross Sc ..... Net Scale	
						Gross Sc ..... Net Scale	
						Gross Sc ..... Net Scale	
						Gross Sc ..... Net Scale	
						Gross Sc ..... Net Scale	
						Gross Sc ..... Net Scale	

(See 12/17/54 Revision)

BOARD TALLY

Mill Scale Study No. (XX) Kind of Tally (X)

Log No. (4 digits)	Lumber grade Code (2 digits)	Lumber grade Symbol	Lumber Tally (3 digits)	T	W	L	Log No. (4 digits)	Lumber grade Code (2 digits)	Lumber grade Symbol	Lumber Tally (3 digits)	T	W	L
(XXXX)	(XX)		(XXX)				(XXXX)	(XX)		(XXX)			

7c. Initial Grade to Final Grades Tally. This form is suggested for use in tallying the sample lumber out of the drying facility or out of the planer. One sheet must be completed for each initial grade of each species. The mill identification, species, and the initial kind of tally (green or rough dry), grade, and total tally of the grade will be recorded in the heading of the form. The final tally (rough dry or surfaced) of each board will be recorded opposite the appropriate final lumber grade in the body of the form. No entries will be made in code.

In the office, the sum of each final lumber grade will be recorded in the "Total" column. These totals will be summed and recorded in the space intitled "Total final lumber recovery from initial lumber grade." The difference between the initial lumber tally of the initial lumber grade and the total final lumber recovery for the initial grade will be recorded in the space entitled "Loss due to _____." The reason for the loss, drying or surfacing, will be indicated.

The information on this form will be used to complete the Initial Grade to Final Grades Record, discussed in sub section 7d.

FPTM-Mill
No. 1573-02 11/54

INITIAL GRADE TO FINAL GRADES TALLY

Mill Scale Study No. (XX)

Species (XX)

Initial Lumber: (Kind Tally (X)
(Grade (XX)
(Total Tally

Final Lumber Grades	Final Lumber Tally by Grade, b.f.	Total
(11) B & Btr		
(12) C Select		
(13) C & Btr		
(14) D Sel.		
(15) Mldg.		
6) Fact. Sel.		
(21) 1 Shop		
(22) 2 Shop		
(23) 3 Shop		
(32) 2 & Btr Com.		
(33) 3 Com.		
(34) 4 Com.		
(35) 5 Com.		
(42) 2 & Btr Dim.		
(43) 3 Dim.		
(44) 4 Dim.		
(80) Cull		

Total final lumber recovery from initial lumber grade _____

ss due to (XX) 1/ _____

Total initial lumber for initial lumber grade _____

1/ Drying = Code 98; surfacing = Code 99.

7d. Initial Grade to Final Grades Record. The data for this record will be obtained from the Initial Grade to Final Grades Tally form discussed in sub section 7c. One sheet will be completed for each initial grade of each species. All information on this record will be recorded in code.

The mill scale study number, species, and the initial lumber-kind of tally (green or rough dry) and grade will be recorded in the heading of the record. The final lumber grades and the tally for each grade will be recorded in the appropriate columns in the body of the form. The loss code and the tally due to loss in drying or surfacing also will be recorded here.

If seven grades, including loss, are obtained from an initial grade, seven lines will be used. The grades and tally will be recorded with the highest grade in first position, ranging down with loss in last position. The total initial lumber tally, including loss, will be recorded in the space at the bottom of the record.

The percent of lumber recovery, final grades (including loss) of the initial grade, will be calculated to the nearest 0.1 percent and recorded in the "percent" column. The total number of final grades (including loss) for the initial grade will be summed and recorded opposite the "Total" of the "Grade" column.

The Initial Lumber Grade to Final Lumber Grades Master Card No. 89 will be key punched from the Initial Grade to Final Grades Record.

FPLM-Mill
No. 1573-02 11/54

INITIAL GRADE TO FINAL GRADES RECORD

Mill Scale Study No. (XX)

Initial Lumber: Kind Tally (X)

Species (XX)

Grade (XX)

Grade Number	Lumber Recovery[1] Grade code	Percent[2]	Tally
First	(XX)	(XXX)	
Second	(XX)	(XXX)	
Third	(XX)	(XXX)	
Fourth	(XX)	(XXX)	
Fifth	(XX)	(XXX)	
Sixth	(XX)	(XXX)	
Seventh	(XX)	(XXX)	
Eighth	(XX)	(XXX)	
Ninth	(XX)	(XXX)	
Total	(X)		

Total Initial Lumber Tally _____

1/ Include the loss due to drying or surfacing as the last "Grade Number."
2/ Percents calculated to 0.1% on the basis of Initial Lumber Tally, including loss.

RE-CAL
FOREST SURVEY
IBM System
Contracts, No. 1573-02

December 17, 1954

PART IV

SUPPLEMENT TO
PLAN FOR COMPILATION OF
MILL SCALE STUDY DATA
by
THE IBM METHOD

Dated November 1954

Prepared by

ROBERT M. MILLER
Division of Forest Economics
California Forest and Range Experiment Station

SUPPLEMENT TO PLAN FOR COMPILATION OF MILL SCALE STUDY DATA by THE IBM METHOD

Since the Plan for Compilation of Mill Scale Study Data was prepared, the first mill scale study has been undertaken at Dinuba in cooperation with the Ivory Pine Company. The log phase of the study at the mill has been completed. The lumber phase has been completed for a small portion of the study lumber. This serves as a guide for the remainder of the lumber phase.

The methods used in obtaining the data for the lumber phase of the study were different than those contemplated at the time the Plan was prepared. Therefore, it is necessary to prepare this Supplement to the Plan, incorporating the changes in method that were used in collecting and recording the study data. These in turn necessitate changes in method of compilation. These changes are discussed in the sections that follow. The sections correspond to the same sections of the Plan for Compilation of Mill Scale Study Data dated November 1954.

1. Introduction

For the lumber phase of the study the method followed was to identify, tally, and grade each board as it passed over the green chain. Each board was recorded for each log by green grade, thickness, and surface tally in square feet. All of the boards from a log were recorded together in a group.

The green lumber was pulled from the chain and stacked in unit packages by four segregations: (a) 4/4 boards; (b) 5/4 Shop and better; (c) 5/4 Moulding and better; and (d) 7/4 3 Common and better dimension. This lumber will be dried and a complete rough dry tally will be made in which each board will be identified, tallied, and graded. A sample of each rough dry grade will be surfaced and tallied out of the planer by surfaced grade. Log and board identity will not be maintained in surfacing.

The sample of the rough dry lumber will be selected after all of the lumber is dried and ready for surfacing. This lumber will be separated from the other study lumber. It will be tallied and stacked for surfacing by thickness, width and rough dry grade groups. The log number, rough dry grade, thickness, width, and length will be recorded for each board on the Lumber Grade and Tally forms. The forms for this sample lumber will be identified and kept separate from the forms for the other study lumber.

The sample boards will be tallied into the planer by thickness, width and rough dry grade group. As each board emerges from the planer it will be graded and recorded on an Ivory Pine Company tally form by surfaced grade and length. One form will be prepared for each rough dry

grade-thickness-width group, so that all surfaced lumber on the form will be of one width, thickness, and rough dry grade except for the 5/4 stock which is random width. For this stock, the surface tally in square feet will be recorded.

The balance of the rough dry study lumber will be completely tallied and graded. Each board will be identified and the log number, lumber grade, thickness, width, and length will be recorded on the Lumber Tally form. These forms will be kept separate from those for the sample boards.

The results of surfacing the sample boards will be applied to all of the rough dry lumber. This information plus that obtained from the complete green tally will be summarized to obtain the statistics of yield by lumber grade for the various log sizes and grades.

2. Compilation of Log Phase Data

The log phase data was collected as contemplated in the Plan. In addition to the control and quantitative data listed as being recorded for each log, the number of boards sawn from each log will be recorded at the extreme right side of the Log Scale form following the net log scale. This information is obtained by counting the number of boards recorded for each log on the Green Lumber Tally form. The number of boards for each log will be key punched in Log Card No. 11.

The punching of this additional information has necessitated re-designing Log Card No. 11. The new specifications for Log Card No. 11 are attached. This page should be substituted for page 13 of the Plan, section 5a, Card No. 11--Log Card.

The compilation procedure will be the same as that outlined in the plan. The green lumber recovery will be summarized for each log and gang punched into the Log Cards.

3. Compilation of Lumber Phase Data

Each board was identified, tallied, and green graded. Each board will be identified, tallied, and rough dry graded.

Green grades and tally were recorded on the Green Lumber Grade and Tally form illustrated in section 7e of this supplement. Rough dry grades and tally will be recorded on the Lumber Grade and Tally form included in section 7b of this supplement. This is the same form as that illustrated in section 7b--Board Tally, of the Plan.

Since complete grading and tallying of both green and rough dry lumber will be done for the Dinuba study, the method of compilation will not be the same as that outlined in the Plan. The green lumber data will be compiled as described in section 3a below. The rough dry lumber data will be compiled following the outline given in sections 3 and 3b of the Plan but incorporating the changes described in section 3b below.

3a. Complete Green Grading

The log number and the surface tally in square feet by green lumber grade and thickness were recorded for each board of each log on the Green Lumber Grade and Tally form. The surface tally will be summed by lumber grade for each log and the grade totals converted to board feet (to 1/10 b.f.) by application of the Thickness Factors (see section 6b, par. (35). The total number of boards sawn from each log will be counted and recorded. In addition, the mill scale study number and the kind of grade and tally (green) will be coded at the top of each form.

The mill scale study number, log number, kind of grade and tally, lumber grade, and the lumber tally in board feet will be punched in the Initial Lumber Grade and Tally Summary Card No. 13, Initial Kind of Tally Code 1. One card will be punched for each lumber grade of each log. These cards will be key punched and verified.

The new specifications for the Initial Lumber Grade and Tally Summary Cards No. 13 are attached. These pages should be substituted for pages 16 and 17 of the Plan, section 5d, Card 13--Initial Lumber Grade and Tally Summary Card.

The Log Cards No. 11 and the Lumber Grade Summary Cards No. 13 will be merged and the log control information (log grade, species, and 4-inch diameter group) will be gang punched into the Lumber Grade cards.

The Initial Lumber Grade and Tally Summary Cards No. 13, Initial Kind of Tally Code 1, will be used to prepare summary tabulations of green lumber recovery by lumber grade, log grade and diameter group. Card No. 13 also will be used to obtain the total green lumber recovery (not including loss), for each log.

3b. Complete Rough Dry Grading

The log number, rough dry lumber grade, thickness, width, and length of each board of each log will be recorded on the Lumber Grade and Tally form. This information, the mill scale study number, and the kind of grade and tally (rough dry) will be coded after the board tally and grading is completed. In addition, the sample of rough dry boards that are to be surfaced will be identified. These boards will be recorded on separate Lumber Grade and Tally forms as described in section 1.

All of the information listed above will be punched in the Board Card No. 12, Kind of Tally Code 2. One card will be punched for each board. These cards will be key punched and verified.

The new specifications for the Board Card No. 12 are attached. This page should be substituted for page 14 of the Plan, section 5b, Card No. 12--Board Card.

The Log Cards No. 11 and the Board Cards No. 12 will be merged and the log control information (log grade, species, and 4-inch diameter group) will be gang punched into the Board Cards.

The Thickness Factor Master Cards No. 88, containing the thickness factors, and the Board Cards No. 12 will be merged. The lumber tally in board feet (to 1/10 b.f.) will be calculated and punched in each Board Card No. 12. This calculation will be proved using the tabulator.

The specifications for the Thickness Factor Master Cards No. 88 are attached. This page should be inserted in the Plan following page 19, as section 5g. Card 88--Thickness Factor Master Card.

A summary tabulation of rough dry lumber recovery by rough dry grade will be prepared for each log using the Board Cards No. 12. At the same time the Initial Lumber Grade and Tally Summary Card No. 13, Initial Kind of Tally Code 2, will be summary punched (see section 5d of the Plan).

The Board Cards No. 12 for the surfacing sample will be separated from the other cards and a summary tabulation will be prepared from them showing the lumber tally by rough dry grade. If all of the rough dry lumber is used in the surfacing sample, the summary tabulation will be prepared from the Initial Lumber Grade and Tally Cards No. 13, Initial Kind of Tally Code 2.

The rough dry lumber in the surfacing sample will be tallied into the planer by thickness, width, and rough dry grade group. Log identity will not be maintained. The number of pieces in each surfaced grade and length class will be recorded for each rough dry grade-thickness-width group, except for the 5/4 thickness group which is random width. For this group the surface tally in square feet will be recorded.

The lumber tally in board feet (to 1/10 b.f.) will be calculated and summarized for each surfaced grade of each rough dry grade-thickness-width group. For all but the 5/4 thickness group, the single piece board foot tally will be recorded for each thickness, width, and length. The number of pieces in that group will be summed, recorded, and multiplied by the single piece footage and the result recorded. The results will be summed for each surfaced grade and recorded. For the 5/4 thickness group, the surface tally in square feet will be summed for each surfaced grade of each rough dry grade and multiplied by the thickness factor. The result, lumber tally in board feet will be recorded.

The surfaced tally by surfaced grade for each rough dry grade will be summarized on the Initial Grade to Final Grades Tally. (See section 7C of the Plan). The total initial lumber tally, before surfacing, for each rough dry grade will be obtained from the previously described summary tabulation of Cards No. 12 (or Card No. 13).

The data on the above form will be summarized as described in the second paragraph of page 6 of the Plan. The Initial Lumber Grade to Final Lumber Grades Master Cards No. 89, Initial Kind of Tally Code 2 will be prepared as described in the third paragraph of page 6 of the Plan.

The new specifications for Card No. 89 are attached. This page should be substituted for page 15 of the Plan, section 5c, Card 89--Initial Lumber Grade to Final Lumber Grades Master Cards.

The procedure outlined in section 3b of the Plan, beginning with the fifth paragraph on page 6, will be followed to complete the compilation of the lumber phase of this mill scale study.

New specifications for Card No. 14 and Card No. 15 are attached. These pages should be substituted in the Plan for page 18, section 5e, Card 14--Final Lumber Grade and Tally by Initial Grade card; and for page 19, section 5f, Card 15--Final Lumber Grade and Tally Summary Card.

4. Summary Tabulations

The following additions are to be made to the Plan:

(a) Page 8, Card No. 11--Log Card, Quantitative Items: add "Number of Boards Sawn."

(b) Page 8, Card No. 12--Board Card, Quantitative Items: add "Surface Tally, square feet; thickness; width, and length." Control Items: add "Sample Board." Note: "Surface tally punched only when length and width are not punched. Length and width punched only when surface tally is not punched." Note: "Card No. 12 will not be prepared for green lumber in the Dinuba Mill Scale Study."

(c) Page 9, Card No. 13--Initial Lumber Grade and Tally Summary Card. Note: "For the Dinuba study, green lumber grades and tally will be punched in the first deck, kind of tally code 1; rough dry lumber grades and tally will be punched in the second deck, kind of tally code 2."

(d) Page 9, Card No. 14--Final Lumber Grade and Tally by Initial Grade Card. Note: "For the Dinuba study, green lumber data will not be present in this deck of cards. These cards will have rough dry grades as the initial data, kind of tally code 2, and surfaced tally as final data, kind of tally code 3.

(e) Page 11, paragraph f: delete this paragraph.

The parts of this section not mentioned above remain unchanged and will apply to the Dinuba Mill Scale Study.

5. Punch Cards Required

New specifications for Cards No. 11, 12, 13, 14, 15 and 89, and for a new card No. 88 are attached. These pages are to be substituted for pages 13 through 19 of the Plan.

6. Coding and Codes

Pages 20 through 25 of the Plan have been revised. The revised pages are attached and should be substituted for the old pages now in the Plan. Several items have been added to the codes for Log Scale, Lumber Grade and Tally, and Initial Grade to Final Grades, and a new section has been added for Green Lumber Tally.

7. Layout of Forms

Control and quantitative data will be transferred to punch cards from four forms for the Dinuba mill scale study. These forms are listed below.

7a. Log Scale (Form #26). With the addition of Number of Boards Sawn at the right side of this form, it remains the same as that discussed and illustrated in the Plan. Since the data were not entered in code at the mill, coding will have to be done in the office. The Log Cards No. 11 will be punched from this form.

7b. Board Tally. This form has been renamed Lumber Grade and Tally. The contents of this form are the same as those discussed in the Plan. However, a slight rearrangement of columns was made. A copy of the form is attached. Rough dry lumber only will be recorded on this form. Thickness, width, and length will be recorded and coded but lumber tally will not be recorded. Coding will be done in the office. The Board Cards No. 12 (rough dry data) will be punched from this form.

7c. Initial Grade to Final Grades Tally. This form will not be used in tallying the sample lumber out of the drying facility or the planer. Instead, it will be used to summarize the data from the forms that are used in tallying the sample lumber.

The sample boards will be tallied into and out of the planer for each rough dry grade by surfaced grade and length, and thickness-width group. This information will be recorded on an Ivory Pine Company forms. The data will be converted to lumber tally in board feet and summarized for each rough dry grade on this Initial Grade to Final Grades Tally form. These data will be summarized as outlined in the second paragraph of section 7c, page 28, of the Plan.

The information on this form will be used to complete the Initial Grade to Final Grades Record.

7d. Initial Grade to Final Grades Record. This form and its use remain the same as discussed in section 7d of the Plan. The initial lumber grades will be rough dry and the final lumber grades will be surfaced. The Initial Lumber Grade to Final Lumber Grades Master Card No. 89 will be key punched from this form.

7e. Green Lumber Grades and Tally. This is a new form that was used for the Dinuba Study. The green lumber surface tally was recorded for each board sawn from each log by thickness and green lumber grade groups.

The surface tally for each grade for each log will be converted to lumber tally to 1/10 of a board foot and recorded on the form as a four-digit number. The mill scale study number and the initial kind of tally (green) will be coded at the top of each sheet. The lumber grade codes will be recorded at the top of each grade column. The number of boards sawn from each log will be recorded in the extreme left column of the form.

The Initial Lumber Grade and Tally Summary Card No. 13 for green lumber will be punched from this form. A copy of the form is attached.

R5TM-Mill Scale
No. 1573-02 12/17/54

LUMBER GRADE & TALLY

Mill Scale Study
Identification (XX) Kind of Tally (X)

Date:

Log No.	Lumber grade		Tally	T	W	L	Log No.	Lumber grade		Tally	T	W	L
	Symbol	Code						Symbol	Code				
(XXXX)		(XX)	(XXX)	(X)	(XX)	(XX)	(XXXX)		(XX)	(XXX)	(X)	(XX)	(XX)

R5TM-Mill Scale
No. 1573-02 12/17/54

GREEN LUMBER GRADES AND TALLY

Mill Scale Study Number (XX) Kind of Tally (X)

			Green Lumber Grades											
	Total:		5/4				4/4				7/4		5/4	
No. of boards	net scale	Log No.	Fact.Sel. (3 Clear)	1 Shop	2 Shop	3 Shop	2 & Btr Common	3 Common	4 Common	5 Common	2 & Btr Dim.	3 Dim.	D Mldg.	C & Btr Sel.

5a. Card No. 11 - Log Card (Insert in 11/54 Plan) Rev. 12/17/54

Punched as indicated in the right hand column below. Log cards will have a right corner cut.

Card Column	Field	Punching[1]
	Controls	
1-2	Card Number	D.P.
3-4	Mill Scale Study Number	D.P.
5-8	Log Number	K.P.
9	Log Grade	K.P.
10-11	Species	K.P. or D.P.
12-13	4-inch Diameter Group (small end)	G.P.
14-15	Log Length, feet (0 dec.)	K.P.
16-17	Diameter, large end, i.b., ins. (0 dec.)	K.P.
18-19	Diameter, small end, i.b., ins. (0 dec.)	K.P.
	Quantitative	
20-22	Gross Scale, Dec.C	K.P.
23-25	Net Scale, Dec. C	K.P.
26-28	Number of Boards Sawn	K.P.
29-32	Net percent of gross scale (3 dec.)	Calc.
33-37	Green Lumber Recovery, FBM (1 dec.)	G.P.
38-41	Green Lumber Percent of net log scale (3 dec.)	Calc.
42-46	Rough Dry Lumber Recovery, FBM (1 dec.)	G.P.
47-50	Rough Dry Lumber Percent of net log scale (3 dec.)	Calc.
51-54	Rough Dry Lumber Percent of green lumber recovery (3 dec)	Calc.
55-59	Surfaced lumber recovery, FBM (1 dec.)	G.P.
60-63	Surfaced lumber percent of net log scale (3 dec.)	Calc.
64-67	Surfaced lumber percent of green lumber recovery(3 dec.)	Calc.
68-71	Surfaced lumber percent of rough dry lumber recovery(3 dec)	Calc.
72-76	Value of rough dry lumber (2 dec.)	Calc.
77-80	Blank columns	-
	X Punches	
60	Control X Punch	G.P.
	12 Punches	
30	Control 12 punch	
29, 38, 47, 51) 61, 64, 68)	A 12 punch in these columns signifies the percentages that occupy the field have been calculated correctly. The 12 punches are in the first column of the respective fields, except for column 61 which is the second column of the field.	

1/ Calc. = Calculated and punched; D.P. = Duplicate punched; G.P. = Gang punched; K.P. = Key punched; S.P. = Summary punched.

5b. Card No. 12 - Board Card (Insert in 11/54 Plan) Rev. 12/17/54

Punched as indicated in the right hand column below. Log control items gang punched from Log Card No. 11. Lumber tally, FBM, calculated using Master Card No. 88. These cards will have a left corner cut.

Card Column	Field	Punching
	Controls - Log	
1-2	Card Number	D.P.
3-4	Mill Scale Study Number	D.P.
5-8	Log Number	K.P.
9	Log Grade	G.P.
10-11	Species	G.P.
12-13	4-inch Diameter Group (small end)	G.P.
	Controls - Lumber	
14	Kind of Grade and Tally	D.P.
15-16	Lumber Grade	K.P.
	Quantitative	
17-20	Lumber Tally, FBM (1 dec.)	Calc. or K.P.
21-24	Surface Tally, Sq. Ft. (1 dec.)	K.P.
25	Thickness (code)	K.P.
26-27	Width, ins. (0 dec.)	K.P.
28-29	Length, Ft. (0 dec.)	K.P.
30	Sample Board	K.P. or D.P.
31-37	Blank columns	-
38-41	Result of width x length multiplication	Calc.
42-80	Blank columns	-
	X Punches	
34	Control X punch	G.P.
	12 Punches	

Rev. 12/17/54

5c. Card 89.- Initial Lumber Grade to Final Lumber Grades Master Cards (Insert in 11/54 Plan)

Punched as indicated in the right hand column below. These cards will have a right corner cut.

(See 5/27/55 revision).

Card Column	Field	Punching
	Controls	
1-2	Card Number	D.P.
3-4	Mill Scale Study Number	D.P.
5-9	Blank Columns	-
10-11	Species	K.P. or D.P.
12-13	Blank Columns	-
14	Kind of Grade and Tally, Initial	D.P.
15-16	Lumber Grade, Initial	K.P.
	Quantitative	
	Final Lumber Grades and Percentages of Initial Grade and Tally:	
17-18	Grade, first	K.P.
19-21	Percent in first (3 dec.)	K.P.
22-23	Grade, second	K.P.
24-26	Percent in second (3 dec.)	K.P.
27-28	Grade, third	K.P.
29-31	Percent in third (3 dec.)	K.P.
32-33	Grade, fourth	K.P.
34-36	Percent in fourth (3 dec.)	K.P.
37-38	Grade, fifth	K.P.
39-41	Percent in fifth (3 dec.)	K.P.
42-43	Grade, sixth	K.P.
44-46	Percent in sixth (3 dec.)	K.P.
47-48	Grade, seventh	K.P.
49-51	Percent in seventh (3 dec.)	K.P.
52-53	Grade, eighth	K.P.
54-56	Percent in eighth (3 dec.)	K.P.
57-58	Grade, ninth	K.P.
59-61	Percent in ninth (3 dec.)	K.P.
62-79	Blank Columns	-
80	Number of final grades for initial grade	K.P.
	X Punches	
12	Control X Punch	G.P.
17,22,27,32,37, 42,47,52,57	Possible X skips	K.P.

12 Punches

Rev. 12/17/54

5d. Card 13 - Initial Lumber Grade and Tally Summary Card (Insert in 11/54 Plan)

Punched as indicated in the right hand column below. Summary punched from Board Card No. 12 or Lumber Grade and Tally Card No. 14, or key punched. Final Lumber grades and tally calculated using Master Card No. 89. These cards will have a left corner cut.

Card Column	Field		Punching Rough Dry	Punching Green
	Controls - Log			
1-2	Card Number		G.P.	D.P.
3-4	Mill Scale Study Number		S.P.	D.P.
5-8	Log Number		S.P.	K.P.
9	Log Grade		S.P.	G.P.
10-11	Species		S.P.	G.P.
12-13	4-inch Diameter Group (small end)		S.P.	G.P.
	Controls - Lumber, initial			
14	Kind of Grade and Tally, Initial		S.P.	D.P.
15-16	Lumber Grade, Initial		S.P.	K.P.
	Quantitative - Lumber, initial			
17-20	Lumber Tally, initial, FBM, (1 dec.)		S.P.	K.P.
	Controls - Lumber, final			
21	Kind of Grade and Tally, Final		G.P.	-
	Final Lumber Grades from Initial Lumber Grade:			
	NX 79 Cards	X 79 Cards		
22-23	Grade, first	Grade, tenth	Calc.	-
24-25	Grade, second	Grade, eleventh	Calc.	-
26-27	Grade, third	Grade, twelfth	Calc.	-
28-29	Grade, fourth		Calc.	-
30-31	Grade, fifth		Calc.	-
32-33	Grade, sixth		Calc.	-
34-35	Grade, seventh		Calc.	-
36-37	Grade, eighth		Calc.	-
38-39	Grade, ninth		Calc.	-
				-
				-

Card 13 (cont.) (Insert in 11/54 Plan)

Card Column	Field	Punching Rough Dry	Green
	Quantitative - Lumber, Final		
	Final Lumber Tally by Final Lumber Grade from Initial Lumber Grade and Tally, FBM (1 dec.):		
	NX 79 Cards / X 79 Cards		
40-43	Tally for first grade / Tally for tenth grade	Calc.	-
44-47	Tally for second grade / Tally for eleventh grade	Calc.	-
48-51	Tally for third grade / Tally for twelfth grade	Calc.	-
52-55	Tally for fourth grade	Calc.	-
56-59	Tally for fifth grade	Calc.	-
60-63	Tally for sixth grade	Calc.	-
64-67	Tally for seventh grade	Calc.	-
68-71	Tally for eighth grade	Calc.	-
72-75	Tally for ninth grade	Calc.	-
76-78	Decimal Accumulation for LT-1 to LT-5 (3 dec.)	Calc.	-
79	Number of final grades for initial grade	G.P. or Calc.	-
80	Blank Column		-
	X Punches		
79	Identifying X punch for Card 13 of initial grades that have more than 9 final grades, for cards with grades 10 to 18.		
80	Control X Punch		
	12 Punches		
79	Identifying 12 punch for initial grades that have more than 9 final grades, for cards with grades 1 to 9.		

Rev. 12/17/54

5e. Card 14 - Final Lumber Grade and Tally by Initial Grade Card
(Insert in 11/54 Plan)

Punched as indicated in the right hand column below. Reproduced from the Initial Lumber Grade and Tally Card No. 13. These cards will have a left corner cut.

Card Column	Field	Punching
	Controls - Log	
1-2	Card Number	G.P.
3-4	Mill Scale Study Number	G.P.
5-8	Log Number	G.P.
9	Log Grade	G.P.
10-11	Species	G.P.
12-13	4-inch Diameter Group (small end)	G.P.
	Controls - Lumber, initial	
14	Kind of Grade and Tally, Initial	G.P.
15-16	Lumber Grade, Initial	G.P.
17-20	Blank Columns	-
	Controls - Lumber, final	
21	Kind of Grade and Tally, final	G.P.
22-23	Lumber Grade, final	G.P.
	Quantitative - Lumber, final	
24-27	Lumber Tally, final (FBM (1 dec.)	G.P.
28-78	Blank columns	-
79	Number of final grades for initial grade	G.P.
80	Final Grade Number	G.P.
	X Punches	
30	Control X Punch	G.P.
79	Identifying X punch for initial grades that have more than 9 final grades, for cards with grades 10 to 18.	
80	Identifying X punch for final grades 10 to 18.	
	12 Punches	
79	Identifying 12 punch for initial grades that have more than 9 final grades for cards with grades 1 to 9.	

Rev. 12/17/54

5f. Card 15 - Final Lumber Grade and Tally Summary Card (Insert in 11/54 Plan)

Punched as indicated in the right hand column below. Summary punched from Final Lumber Grade and Tally Card No. 14. These cards will have a left corner cut.

Card Column	Field	Punching
	Controls - Log	
1-2	Card Number	G.P.
3-4	Mill Scale Study Number	S.P.
5-8	Log Number	S.P.
9	Log Grade	S.P.
10-11	Species	S.P.
12-13	4-inch Diameter Group (small end)	S.P.
	Controls - Lumber, final	
14	Kind of Grade and Tally, final	G.P.
15-16	Lumber Grade, final	S.P.
	Quantitative - Lumber, final	
17-20	Lumber Tally, final, FBM (1 dec.)	S.P.
21-80	Blank columns	-
	X Punches	
34	Control X Punch	G.P.
	12 Punches	

Rev. 12/17/54

5g. Card 88 - Thickness Factor Master Card (Insert in 11/54 Plan)

Punched as indicated in the right hand column below. These cards will have a right corner cut.

Card Column	Field	Punching
	Controls	
1-2	Card Number	D.P.
3-24	Blank columns	-
25	Thickness Code	K.P.
26-30	Blank columns	-
	Quantitative	
31-34	Thickness Factor for length and width (4 dec.)	K.P.
35-37	Thickness Factor for Surface Tally (2 dec.)	K.P.
38-80	Blank columns	-
	X Punches	
60	Control X Punch	G.P.
	12 Punches	
65	Control 12 punch	

6. Coding and Codes (Insert in 11/54 Plan)

a. Coding

Each item that is punched in the cards must be expressed in a numerical code. The codes for each item are entered in the spaces provided for them on the original documents. (See section 7). Complete codes must be entered in all instances, using the total number of digits allowed for that particular code. Where the entry consists of numbers now present on the documents (such as log length, diameter, scale, and other similar entries) zeros must be added to the left of the first significant digit, if necessary, to use the total number of digits allowed for that item. If an entry is composed entirely of zeros, enter all of the zeros needed to use the total number of digits for that item.

Codes should be entered on the original documents, above or to one side of the item being coded, in a legible manner using colored pencil or ink. No erasures should be made. Instead, cross out the incorrect entry and place the correct entry above or to one side of the incorrect entry.

The codes are presented in four parts: first, all of the codes that are entered on the Log Scale form No. 26; second, all of the codes that are entered on the Green Lumber Grade and Tally form; third, all of the codes that are entered on the Lumber Grade and Tally form; and fourth, all of the codes that are entered on the Initial Grade to Final Grades Record. Within each of these parts the main item codes are given in the order that they are recorded on the original documents. Within each main item the individual items to be coded are listed in numerical order of the code.

b. Codes

The mill scale study codes by main item are:

(1) Card Number. Not recorded on any document. Duplicated as a two-digit code as the cards are key punched; or gang punched as the cards are reproduced. The card numbers are:

11 - Log Card
12 - Board Card
13 - Initial Lumber Grade and Tally Summary Card
14 - Final Lumber Grade and Tally by Initial Grade Card
15 - Final Lumber Grade and Tally Summary Card

(See also the List of IBM Card Decks for Compilation of Mill Scale Study Data, section 5 of the Summary).

88 - Thickness Factor Master Card
89 - Initial Lumber Grade to Final Lumber Grades Master Card

Log Scale Form No. 26 Codes (Insert in 11/54 Plan)

(2) Mill Scale Study Number. Recorded as a two-digit code at the top left side of the form. For numbers 1 to 9, record one zero to the left. This item usually will be gang punched or duplicated. The mill scale study numbers are:

01 - Dinuba Study (Ivory Pine Co.) 1954-55
02 - Martel Study (Winton Lumber Co.) 1955
03 -
04 -
05 -

(3) Log Number. Recorded as a four-digit code in the Log No. (or Mill No.) column for each log. If it is known that a mill scale study will consist of not more than 999 logs of all species, the log number may be recorded as a three-digit code. For numbers 1 to 9, record three (or two) zeros to the left; for numbers 10 to 99, record two (or one) zeros to the left; and for numbers 100 to 999, record one (or no) zeros to the left. Some examples of complete log number codes are:

Symbol	Code when 1000 or more logs	Code when 999 or less logs
3	0003	003
87	0087	087
241	0241	241
1075	1075	-

(4) Log Grade. Recorded as a single-digit code in the Log Grade column (right half of the Log No. or Mill No. column) for each log. The log grade codes correspond to the log grade symbols of the log grades being used for a particular mill scale study. The general log grade codes are:

1 Log Grade 1
2 Log Grade 2
3 Log Grade 3
4 Log Grade 4
5 Log Grade 5
6 Log Grade 6
9 Cull Log

The specific log grade codes for the Dinuba Study are:

1 Log Grade 1
2 Log Grade 2
3 Log Grade 3a
4 Log Grade 3b
5 Log Grade 3c
9 Cull Log

(Insert in 11/54 Plan)

(10) Scale, Gross. Recorded as a three-digit code in the Scale and Defects column, Gross Sc. line for each log. For scales of 1 to 9, record two zeros to the left; and for scales of 10 to 99, record one zero to the left. The gross scale is in Scribner Dec. C.

(11) Scale, Net. Recorded as a three-digit code in the Scale and Defects column, Net Scale line for each log. For scales of 1 to 9, record two zeros to the left; and for scales of 10 to 99, record one zero to the left. The net scale is in Scribner Dec. C.

(12) Number of Boards Sawn. Recorded as a two-digit code following the Net Scale for each log. For numbers up to 9, record one zero to left. This number is obtained from the Green Lumber Grade and Tally form. The number is recorded for each log on the Lumber form in the extreme left hand column.

Green Lumber Tally Codes new 12/17/54

(13) Mill Scale Study Number. Recorded as a two-digit code at the top left side of each form. This item usually will be gang punched or duplicated. The mill scale study numbers are listed in paragraph (2) of this subsection.

(14) Kind of Tally. Recorded as a single-digit code at the top of of the form above the Log Number column. The kind of Tally Codes are:

1 Green Grade and Tally
2 Rough Dry Grade and Tally
3 Surfaced Grade and Tally

(15) Log Number. Recorded as a four-digit code in the Log No. column for each board. If it is known that a mill scale study will consist of not more than 999 logs of all species, the log number may be recorded as a three-digit code. For numbers 1 to 9, record three (or two) zeros to the left; for numbers 10 to 99, record two (or one) zeros to the left; and for numbers 100 to 999, record one (or no) zeros to the left. (See also paragraph (3) of this subsection).

(16) Lumber Grade. Recorded as a two-digit code at the top of each lumber grade column of each form. The lumber grade codes are:

Code	Grade	Code	Grade
11	B and Better	32	2 and Better Common
12	C Select	33	3 Common
13	C and Better	34	4 Common
14	D Select	35	5 Common
15	Moulding	42	2 and Better Dimension
16	Factory Select (3 Clear)	43	3 Dimension
21	1 Shop	44	4 Dimension
22	2 Shop	45	5 Dimension
23	3 Shop	80	Cull
		98	Loss due to drying
		99	Loss due to surfacing

(17) Lumber Tally. Recorded as a four-digit code to 1/10th board foot for each lumber grade of each log. For tallies of 0.1 to 0.9, record three zeros to the left; for tallies of 1.0 to 9.9, record two zeros to the left; and for tallies of 10.0 to 99.9, record one zero to the left.

Lumber Grade and Tally Codes Rev. 12/17/54

(18) Mill Scale Study Number. Recorded as a two-digit code in the space provided at the top of the form. This item usually will be gang punched or duplicated. The mill scale study numbers are listed in paragraph (2) of this subsection.

(19) Kind of Tally. Recorded as a single-digit code in the space provided at the top of the form. The kind of tally recorded on the Board Tally form is that for which all of the boards for each log are 100 percent tallied and graded. The kind of tally codes are:

1 Green Grade and Tally
2 Rough Dry Grade and Tally
3 Surfaced Grade and Tally
5 Surfaced Grade and Tally - Gross on separate Cards No. 16
6 Surfaced Grade & Tally - Net on separate Cards No. 16
9 Surfaced Grade & Tally -Gross & Net on same Cards No. 16

(20) Sample Board. Recorded as a single-digit code at the top right side of the form beneath the kind of tally space for all rough dry boards that are in the surfacing sample. Nothing is recorded on the forms for the boards that are not in the sample. The sample board codes are:

1 Sample board for surfacing sample
No Code Non sample board for surfacing sample

(21) Log Number. Recorded as a four-digit code in the Log No. column for each board. If it is known that a mill scale study will consist of not more than 999 logs of all species, the log number may be recorded as a three-digit code. For numbers 1 to 9, record three (or two) zeros to the left; for numbers 10 to 99, record two (or one) zeros to the left; and for numbers 100 to 999, record one (or no) zeros to the left. (See also paragraph (3) of this subsection).

(22) Lumber Grade. Recorded as a two-digit code in the Lumber Grade (code) column for each board. The lumber grade codes are:

Code	Grade	Code	Grade
11	B and better	32	2 and Better Common
12	C Select	33	3 Common
13	C and better	34	4 Common
14	D Select	35	5 Common
15	Moulding	42	2 and Better Dimension
16	Factory Select (3 Clear)	43	3 Dimension
21	1 Shop	44	4 Dimension
22	2 Shop	45	5 Dimension
23	3 Shop	80	Cull
		98	Loss due to drying
		99	Loss due to surfacing

(23) Lumber Tally, Board Feet. Recorded as a four digit code to 1/10th board foot in the Lumber Tally column for each board. For tallies of .1 to .9, record three zeros to the left; for tallies of 1.0 to 9.9, record two zeros to the left; and for tallies of 10.0 to 99.9, record one zero to the left. Lumber tally may not be recorded at the mill in board feet. If not, the board foot lumber tally will not be coded here. Instead Surface Tally may be coded; see paragraph (24) below.

(24) Surface Tally, Square Feet. Recorded as a four-digit code to 1/10 square foot on the Lumber Tally column for each board. For tallies of 0.1 to 0.9, record three zeros to the left; for tallies of 1.0 to 9.9, record two zeros to the left; and for tallies of 10.0 to 99.9, record one zero to the left. Surface tally may not be recorded at the mill. If not, lumber tally may be recorded or nothing may be recorded. If nothing is recorded in this column, no code is entered. Instead the length and width of the board will be coded; see paragraphs (26) and (27) below.

(25) Thickness. Recorded at the mill as a fractional number, like 4/4, 5/4, 7/4, 8/4, 10/4, 12/4, or 16/4 for each board. Thickness will be recorded and punched only if lumber tally in board feet is not recorded. The number in the numerator of the fraction becomes the thickness code except for 10/4, 12/4, and 16/4 when the codes are 0, 2, and 1 respectively. The thickness codes are:

4	4/4	8	8/4
5	5/4	0	10/4
6	6/4	2	12/4
7	7/4	1	16/4

(26) Width. Recorded at the mill as a single- or two-digit number for each board. For widths of 1 to 9, record one zero to the left. Width is recorded, coded, and punched only if lumber tally in board feet or surface tally in square feet are not recorded and punched. (See paragraphs 22 and 23 of this subsection).

(27) Length. Recorded at the mill as a single- or two-digit number for each board. For lengths of 1 to 9, record one zero to the left. Length is recorded, coded, and punched only if lumber tally in board feet or surface tally in square feet are not recorded and punched. (See paragraphs 22 and 23 of this subsection).

Initial Grade to Final Grades Record Codes

(28) Mill Scale Study Number. Recorded as a two-digit code in the space provided at the top of the Record. This item usually will be gang punched or duplicated. The mill scale study numbers are listed in paragraph (2) of this subsection.

(29) Species. Recorded as a two-digit code in the space provided at the top of the Record. The species codes are listed in paragraph (5) of this subsection.

(30) Kind of Initial Tally. Recorded as a single-digit code in the space provided at the top of the record. The kind of tally code to record here is that for the initial lumber grade and tally. If the initial lumber sample was taken from green grades, record code 1; if the initial lumber sample was taken from rough dry grades, record code 2. The kind of tally codes are listed in paragraph (19) of this subsection.

(31) Lumber Grade, Initial. Recorded as a two-digit code in the space provided at the top of the record. The lumber grade code to record here is that for the grade from which the sample was drawn (i.e. all of the final grades were initially this one green grade or this one rough dry grade). The lumber grade codes are listed in paragraph (16) of this subsection.

(32) Lumber Grade, Final. Recorded as a two-digit code in the Grade column, with each final grade (rough dry or surfaced) recorded on a separate line. If six final grades are obtained from an initial grade, a final grade code is recorded opposite lines first--to sixth. The loss code for loss due to drying or surfacing is recorded as the last final grade (seventh line in the illustration). The lumber grade codes are listed in paragraph (16) of this subsection.

(33) Lumber Recovery Percent. Recorded as a three-digit code in the Percent column with the percent recovery recorded opposite the proper lumber grade. For percents .1 to .9, record two zeros to the left; for percents 1.0 to 1.9, record one zero to the left. The lumber recovery percents are calculated on the basis of the initial lumber tally. The percent loss is calculated and recorded. The lumber recovery percents are calculated and recorded to the nearest 0.1 percent.

(34) Number of Final Grades for Initial Grade. Recorded as a single-digit code on the Total line of the Grade column. This is the total number of final grades obtained for each initial grade, including the loss, after drying or surfacing.

(35) Tally, Lumber--FBM. Recorded to 1/10th board foot in the Tally column, with the tally for each final grade recorded on a separate line. The footage due to loss should be included as the last entry. The sum of the grade recoveries, including loss, should equal the initial lumber tally for the initial lumber grade. The final lumber tallies by final lumber grade for each initial lumber grade are obtained from the Initial Grade to Final Grades Tally record. The lumber tally is not coded or punched.

Table of Thickness Factors (new 12/17/54)

(36) Thickness Factors. The thickness factors given below are to be punched in the Thickness Factor Master Cards No. 88. These factors are for use in converting either surface tally in square feet, or length and width measurements to board feet to 1/10th of a foot. The thickness factors for each board thickness are:

Thickness	Thickness Code	Thickness factors for L' X W"	Thickness factors for Surface Tally, sq. ft.
4/4	4	.0833	1.00
5/4	5	.1042	1.25
6/4	6	.1250	1.50
7/4	7	.1458	1.75
8/4	8	.1667	2.00
10/4	0	.2083	2.50
12/4	2	.2500	3.00
16/4	1	.3333	4.00

* * * *

Agriculture--Forest Service, Berkeley, Calif.